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THE MICRO USER

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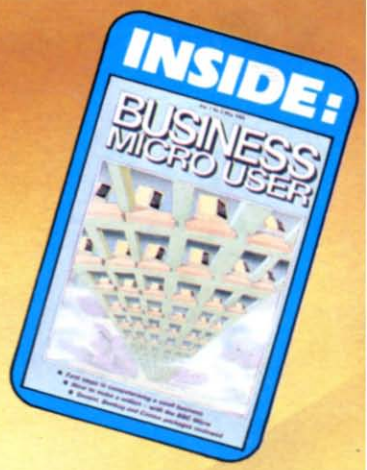
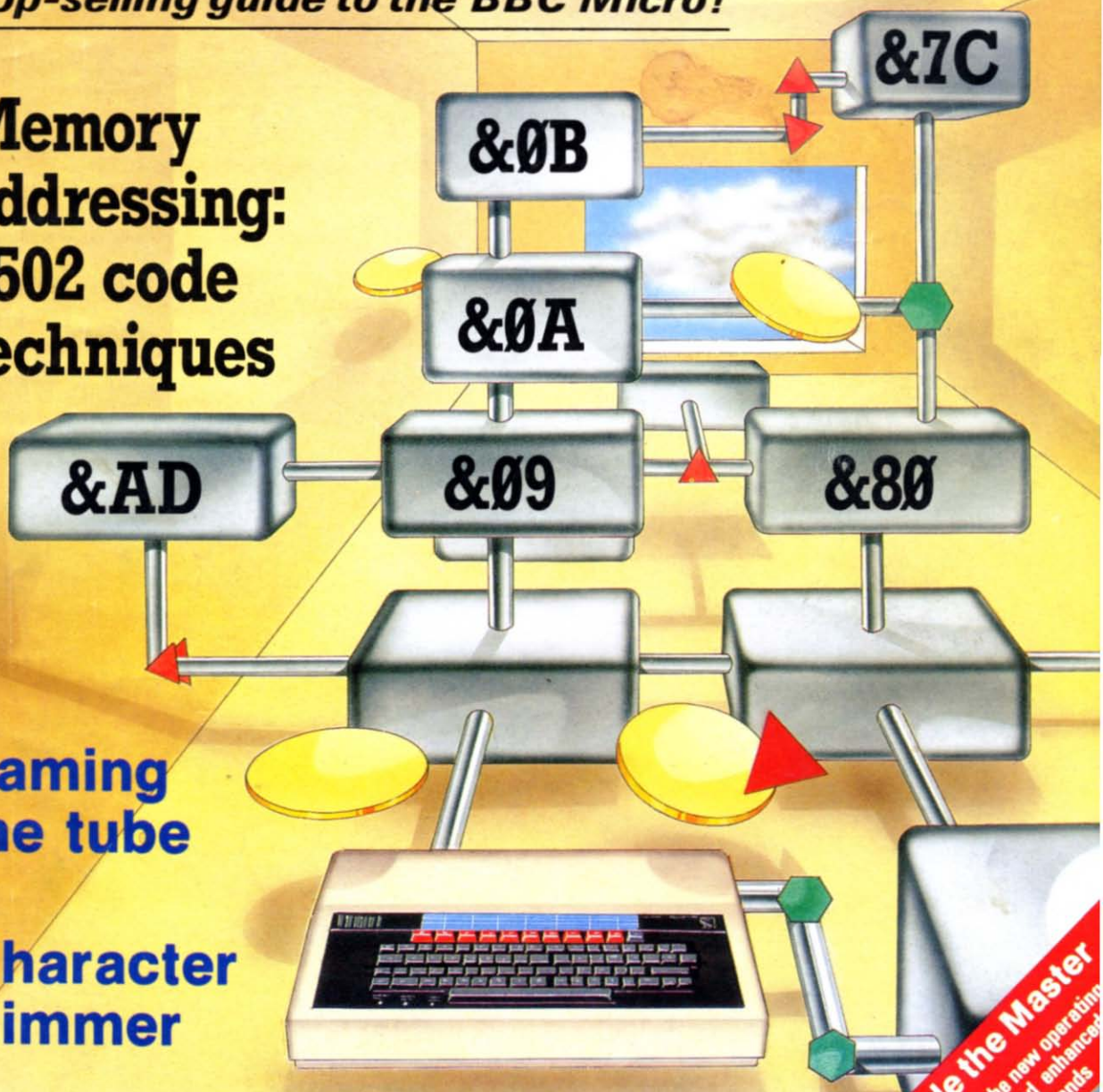


Top-selling guide to the BBC Micro!

Memory addressing: 6502 code techniques

Taming the tube

Character slimmer



Inside the Master
All about the new operating system and enhanced * commands

Action & strategy games: Full listing

CUB'S COLOURFUL MASTER PIECE

Acorn's BBC Master Series bring exciting new levels of sophistication to a proven family of micro computers. Unfortunately, not all monitors on the market can do justice to the Master Series' colour display capabilities.

That's why more BBC users choose a Microvitec CUB colour monitor than any other – because every model in the CUB family is a masterpiece of high performance British design. The clarity, depth of colour and rock steady image seen on a CUB display allows the user to exploit graphics and text to the full – just ask for a demonstration of a CUB alongside someone else's monitor and you'll be totally convinced.

In the meantime, the picture above amply demonstrates why a CUB is a delight to the eye in more ways than one.

Model	Resolution	Screen	Bandwidth	Application
1431/DS4	Standard 452(H) x 550(V)	–	18 MHz	Education, Home, Colour graphics use
1451/DS4	Medium 653(H) x 550(V)	Anti-glare	18 MHz	80 column, text-processing. High quality graphics.
1441/DS4	High 895(H) x 550(V)	Anti-glare	18 MHz	High-resolution graphics and text applications.

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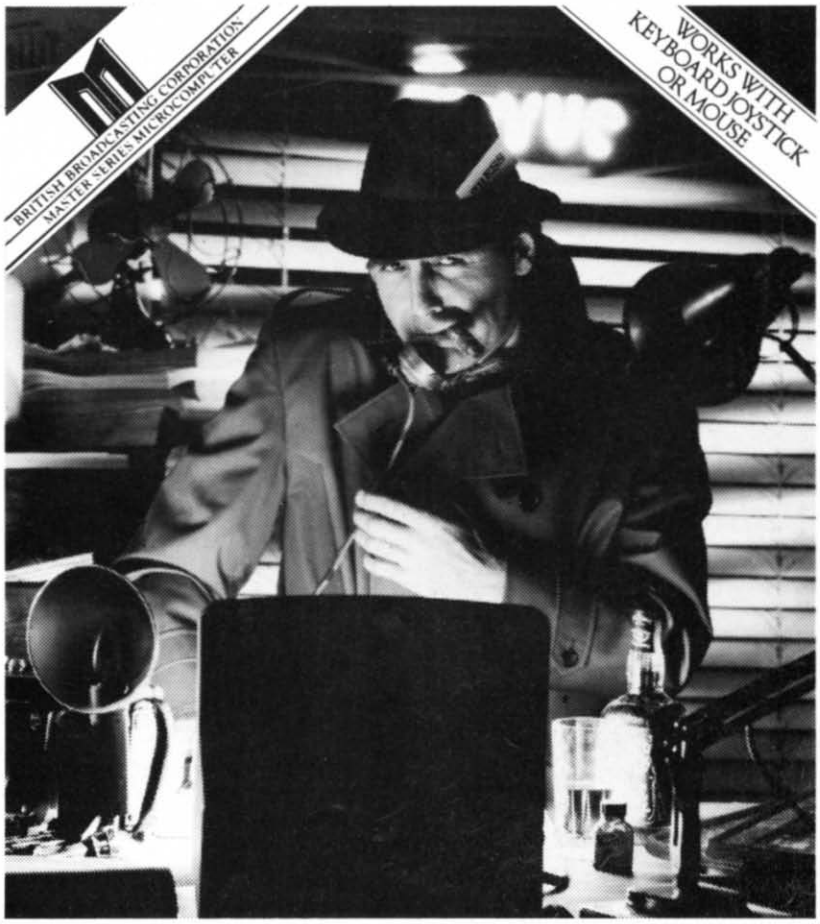
When the press use such words as 'Phenomenal', 'Outstanding', 'Ideal' and 'Worth Every Penny', they've obviously discovered something rather special.

But when that something turns out to be a product in which they are already expert, then it must be something very special indeed. The object of their enthusiasm is AMX Pagemaker – a revolutionary software program that will produce newspapers, posters, leaflets, notices and hand-outs – in fact anything where text and graphics are required, to an extraordinary professional standard.

It's a complete graphics design system and word processor rolled into one.

AMX Pagemaker consists of two Roms and two discs therefore it will work on a standard BBC or B+ micro without a Rom board.

AMX Pagemaker is fully compatible with either the AMX Mouse – joystick or keyboard and requires the minimum of a single 40 track disc drive. It has real time graphics with fast continuous scrolling up and down an A4 page and uses Mode 0, the highest graphics resolution on the BBC.



The program that's making front page news.

READ ALL ABOUT IT.

You can type directly on to the screen, with any of the 16 typefaces supplied or design your own, alternatively, you can load in wordwise and view files with fully automatic on screen text formating as they load. Either way centering, ragged right and literal justification are all available. There is full pixel resolution control over character size and spacing: Also included is a Micro justification facility.

EXTRA, EXTRA.

There are outstanding facilities for drawing, spraying and painting, using either the patterns supplied, or your own pattern designs, enabling you to achieve some incredible graphic results. A complete Mode conversion program is included allowing you to load in drawings and digitised pictures from all BBC graphic modes. The cut and paste facilities include: copying, moving, rotating, stretching and a fantastic zoom is also available.

The previewer allows you to view three A4 pages at any time, before work is output to a wide range of dot matrix printers including: Epson FX/RX/LX/LQ, Canon PW-1080, Kaga KP810, Mannesman Tally MT-80+, Seikosha SP-1000A, Star Delta, Star SG10. And any that are compatible with the above.

AMX Pagemaker is your opportunity to join the publishing revolution, it comes complete with a comprehensive manual which the press describes as 'Superb'.

At only £49.95 the cost of the Pagemaker is as amazing as the program itself.

Let's leave the last word to the press.

*"Pagemaker" is phenomenal – it lends itself to creating anything where text and graphics are involved – notices, posters, leaflets, hand-outs, newsheets. Packages like this have been the province of the 16 – bit micros until now, this product is worth every penny of £49.95."

* 'Educational Computing', January 1986.

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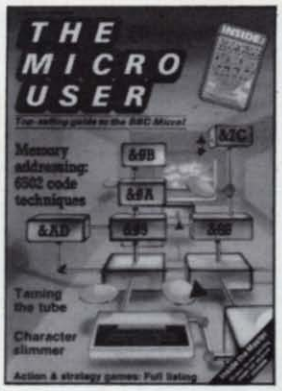

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ABC 64,956 January-June 1985

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Guide Cecil around the hazard-strewn mine and collect the diamonds before his oxygen runs out.

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In this clever extended version of noughts and crosses the rules are simple – but not the strategy.

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With this handy utility most of your disc operations can be performed quickly with a single keypress.

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2 Riches to riches
How Nazir Jessa, a successful optician, changed course and founded Watford Electronics, building it into a multi-million pound empire based on the BBC Micro.

7 Spreadsheets
A new series to explain how spreadsheets work – and to show how useful and fascinating they can be.

11 Software solution
With the help of a fictitious company, we describe how a small firm can become computerised.

19 Business packages
We review Gemini's Life and Business Organiser and Money Management, Beebugsoft's Masterfile II, and Contex's Spreadsheet Mk V.

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A rare breed

DO YOU know the ins and outs of the BBC Micro?
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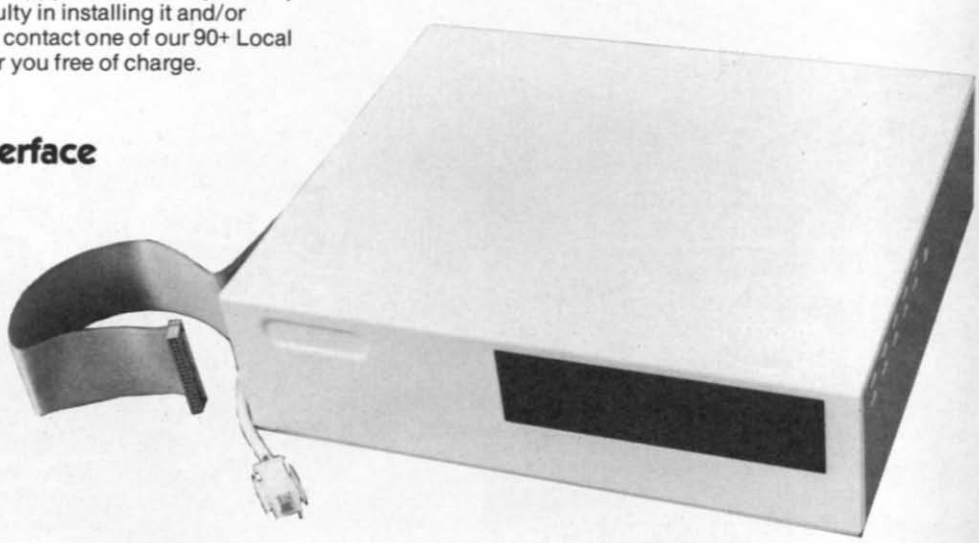
Solidisk offers well designed Disc Interfaces enabling your computer to use floppy disc drives. If you feel you would have any difficulty in installing it and/or adding disc drives, you can contact one of our 90+ Local Experts who will install it for you free of charge.



The 1770 Disc Interface

The Solidisk 1770 Double Density Disc Interface has only four components and can easily be fitted even by a novice. The 1770 Disc Interface is supplied with Solidisk 2.2 DFS ROM.

The Solidisk 1770+8271 Disc Interface

If you already have a 8271 Disc Interface, then the Solidisk 1770+8271 Interface will give you the best of both worlds. You can select either the 8271 or the 1770 at a flick of a switch. The 1770+8271 Interface is supplied with the Solidisk DFS+ADFS ROM set. This is available in two 16K or one 32K ROM.

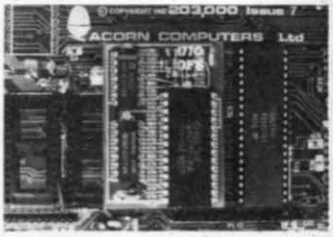
Features built into ROM	DFS 2.2	ADFS
Disc formatter	yes	yes
Disc verifier	yes	yes
Memory editor	yes	yes
Disc sector editor	yes	yes
Disc copier	yes	yes
Recover & Restore	yes	yes
Read track & Write track	yes	yes
Run 8271 floppy disc controller	yes	no
Osword 7F emulator for 1770	yes	yes
Tape to disc	yes	yes
Download	yes	yes
DFS files to ADFS	no	yes
ADFS files to DFS	no	yes
40/80 switching for 80-track drives	yes	only in DFS
Solidisk Winchester	no	yes
6502, Z80 and 32016 compatible	yes	yes
Read & Write IBM-PC DOS discs	yes	yes

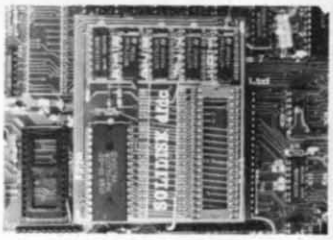
Both the DFS and ADFS have every facility that you would expect. They can run most protected software, such as Elite, Castle Quest, Island Logic's Music System etc. Other features include read after write, and the option of double density operation (with the 1770 chip) giving 60% extra storage capacity. Their compatibility with all Acorn Second Processors (6502, Z80 and 32016) and Econet File Server (Level 2), and their capability of reading from and writing to IBM-PC DOS diskettes (with the 1770 chip) reflect the broad range of applications supported. Both 1770 and 1770+8271 Disc Interfaces are compatible with Acorn 1770 DNFS and ADFS ROMs.

The DFS and ADFS ROMs can be used to enhance both standard Acorn 8271 or 1770 Disc Interfaces, on the BBC Model B or the B Plus.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00





Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

chesters from Solidisk

The Solidisk Winchesters are now available for the BBC Model B, B Plus and the new Master Series machines. They are supplied with the Solidisk DFS+ADFS ROM set, available in two 16K or one 32K ROM.

WINCHESTER FOR SINGLE USERS

The Solidisk ADFS can handle one or two Winchester drives plus one or two floppy disc drives. Files on any drive can be up to the drive size in length. Up to 10 files can be open at the same time and unlimited numbers can be organised in a multi-level catalogue. Files can grow in place without risk of "Can't extend".

The ADFS allows the Winchester to be "partitioned" into multiple user areas, accessed by CP/M (Z80), Panos (32016) as well as 6502 ADFS. The Acorn Z80 Second Processor as supplied requires a new BIOS ROM to run CP/M.

WINCHESTERS FOR SMALL NETWORKS

Solidisk will soon introduce the NET-DISC Filing System (NDFS). This, although using the standard ECONET hardware, implements a direct link between any workstation and the Winchester disc drive on station 254. No dedicated file server machine (nor any Second Processor to run the File Server software) is needed.

The NDFS will also be suitable to network 32016 and Z80 Second Processors. The cost saving is substantial, especially for small networks. For example, four workstations sharing one Winchester via such a network is cheaper than four stand-alone machines equipped with local floppy disc drives.

WINCHESTERS FOR LEVEL 2 FILE SERVERS

The Solidisk Winchester Disc Filing System (WDFS) ROM enables the Acorn File Server (Level 2) to use the Winchester in place of floppy disc drives. This will improve both speed and capacity. The WDFS will work with either the 8271 or the 1770 Disc Interfaces.

HIGHER CAPACITY, RELIABILITY AND SPEED

The Winchester drives have much higher capacity than floppy discs, measured in Megabytes instead of Kilobytes. The disc is protected from dirt by a sealed casing, and has a much higher inherent reliability. The disc rotates continuously at high speed (3600rpm) enabling data to be transferred 20 times as fast as floppy discs.

HARDWARE REQUIREMENTS

To use a Solidisk Winchester, you will need a 1770 Disc Interface (Acorn or Solidisk). Master and BBC B Plus machines have this as standard. If your BBC B has no disc interface, we recommend the Solidisk 1770 Disc Interface. If you already have the 8271 Disc Interface, we recommend the Solidisk 8271+1770 Disc Interface. The Winchester drive is connected to the 1MHz bus socket.

5.25 inch WINCHESTERS

These drives (10, 20 and 40 Megabytes formatted) are of established design, with low noise and power consumption and have the same "form factor" as a half-height floppy drive.

3.5 inch WINCHESTERS

These are of the latest technology, with even lower noise and power consumption in a smaller package, and have the same "form factor" as a 3.5 inch floppy drive.

BEEB-POWERED OR MAINS-POWERED

The Beeb-powered Winchesters are only suitable for use with machines fitted with the shiny, switched mode power supply and all Master series. The Winchester power lead will also support a floppy disc drive. In other cases, a mains-powered Winchester should be specified.

THE SOLIDISK WINCHESTER RANGE

Each Winchester drive comes with:

— Integral power and data leads.
— DFS (or WDFS on request) and ADFS ROM set.
— One utility diskette in 5.25 inch, 80-track double-sided ADFS format.
— Manuals covering the above hardware and software.
— One year guarantee.

The Solidisk Winchesters are available in the following packages:

	BEEB-POWERED	MAINS-POWERED
10 Megabytes 5.25 inch	**£499.00**	**Not available**
20 Megabytes 3.5 inch	**£720.00**	**Not available**
20 Megabytes 5.25 inch	**£661.25**	**£747.50**
40 Megabytes 5.25 inch	**£1062.60**	**£1148.85**

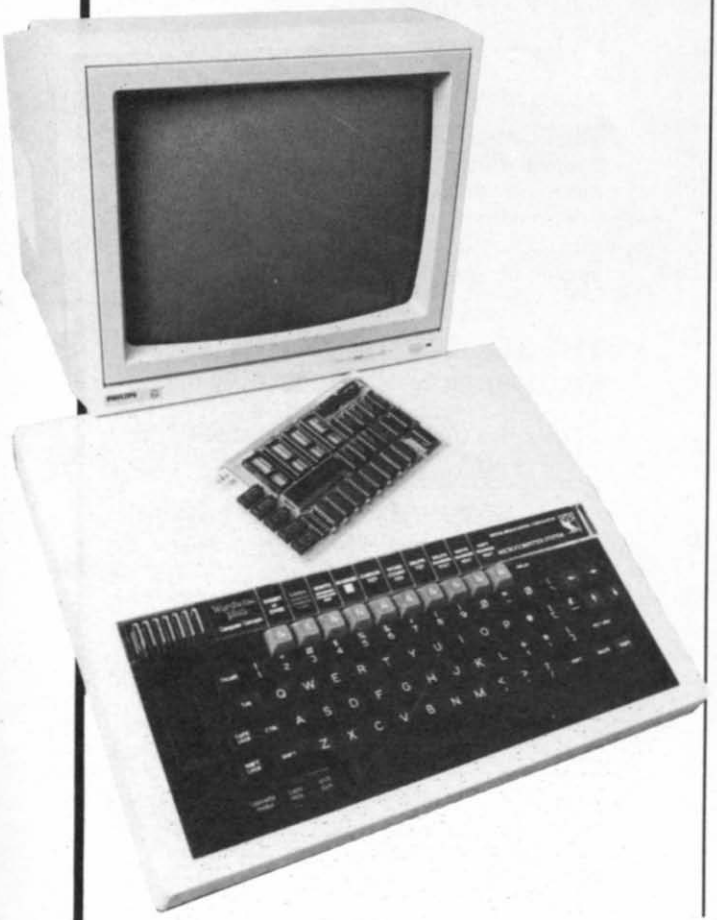
Delivery (in the UK) by courier £10.00. All prices include VAT at 15%.

SOLIDISK MEMORY UPGRADES

Solidisk memory upgrades for the BBC Model B offer excellent value for money. Their designs stand our for compatibility, speed, versatility and computing power. They use the latest component technology to achieve the lowest possible power consumption and size at low cost.

External ROM Cartridge

This comprises an adaptor which plugs into any ROM socket, and a blank cartridge which will accept one or two ROMs. These may be of 16K, 32K or 64K, depending on the capacity of the ROM socket holding the adaptor. This system is particularly useful for seldomly used ROMs, which are well protected by the cartridges. They can be installed and removed repeatedly without any risk to the ROMs and are compatible with Acorn cartridges.



Fourmeg CPU and ROM Expansion

The Fourmeg board plugs into the 6502 Processor socket, and two additional connections are made by sprung clips. It also provides one 64K and three 32K additional ROM sockets.

By adding faster memory and a 4MHz Processor, this board enables the BBC to run most programs in half the time. The new Processor is equivalent to that used on the Acorn TURBO board. It will run most Master software such as the new BASIC 4 and at twice the speed.
A switch selects between normal (2MHz) and fast (4MHz) speed. The higher speed is available to all ROMs and RAM installed in the Fourmeg board. The rest of the machine is unaffected.

Fourmeg Board with 32K RAM

This comprises a Fourmeg board with 32K RAM and a 16K MANAGER ROM. This extra RAM gives Shadow RAM and Sideways RAM capability. Shadow RAM supports the screen in any mode, leaving all the machine RAM free. Sideways RAM can contain the images of two Sideways ROMs or used as RAMDISK or printer buffer. Shadow and Sideways RAM, and the four additional ROM sockets can be switched to the fast 4MHz speed.

32K, 64K and 128K Sideways RAMS

These are the most popular add-ons for the BBC Model B. You can start with 32K and upgrade later to 64K, 128K (and even 256K). The 64K and 128K RAM boards have two 32K additional ROM sockets.

Solidisk Sideways RAM boards are compatible with most add-ons except ROM boards — which they replace. Sideways RAM can run almost all software that is normally available in ROM. Solidisk has a large library of application programs. These include Word-processor, Spelling Checker, Database, Spreadsheet, Extended Basic, Sprites, Ramdisc, Printed Buffer, Machine Code Monitor etc. and more than 70 computer games especially written for Sideways RAM. The programs are available in three packs, each of 5 discs, in 40 or 80-track formats. Pack 1 is included with all Sideways RAM board. Packs 2 and 3 cost £10.00 each (£1.00 p&p). Pack 3 consists entirely of games and game design tools.

The 256K Board

This has 256K of RAM, four ROM sockets, a 4MHz Processor, a 32K Manager ROM, together with WORDWISE PLUS — the best selling Wordprocessor from Computer Concepts.

The 256K RAM can be used as Shadow RAM, Sideways RAM and RAMDISK, or any combination of the three.

Real Time Clock and Solidesk

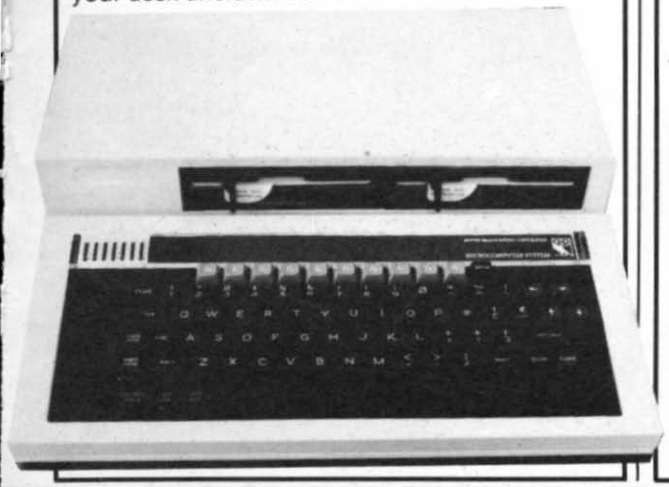
The Real Time Clock (RTC) is battery powered, giving accurate time and date. The "SOLIDESK" ROM uses the 50 bytes of battery backed RAM in the RTC chip to custom-configure the BBC computer on start-up — just like the new Master Machine. It also presents a friendly ICON/MOUSE environment — with calculator, memo and a number of disc operating system commands (DFS and ADFS). An AMX Mouse or a Marconi Tracker Ball is preferred as the input device, but the keyboard may also be used.

Floppy Disc Drives

Solidisk floppy disc drives are 80-track, double-sided, 5.25 inch, with a capacity of 640K in ADFS or Solidisk double density DFS. They are Beeb-powered, supplied cased, with power and data leads, and a software pack of 5 diskettes.

The CPU and Keyboard Case

This compact steel case can hold a BBC and two 5.25 inch half-height floppy disc drives. The keyboard is housed in a separate case connected by a 24 inch lead. With the monitor on top, it improves your viewing angle and leaves your desk uncluttered.



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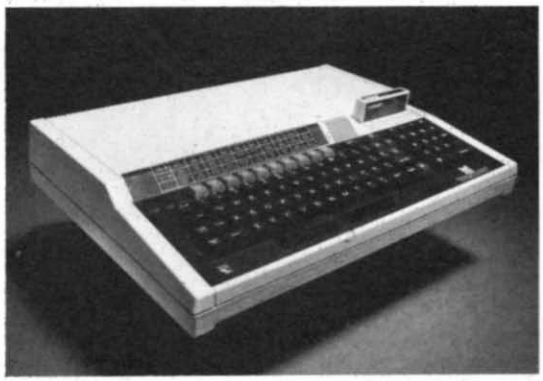


Solidisk Technology Ltd 17 Sweyne Avenue, Southend SS2 6JQ

The Linemaster ROM

The Solidisk Linemaster ROM allows the BBC micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

Telecom Gold

Telecom Gold is the British Telecom electronic Mail Service enabling computer users to send and receive messages, telexes and to access many large databases. The Linemaster ROM allows you to use the BBC computer to communicate with Telecom Gold and Bulletin Boards. Its features include various baud rates and protocols, an elapsed time clock and 40/80 column screen display.

Prestel

Prestel i the British Telecom Viewdata service. The Linemaster ROM offers extensive facilities to communicate with Prestel. If you have an autodialling Modem, a simple command such as ★PRESTEL 618 (for London) can put you "online" with the local Prestel computer.

Viewdata Host

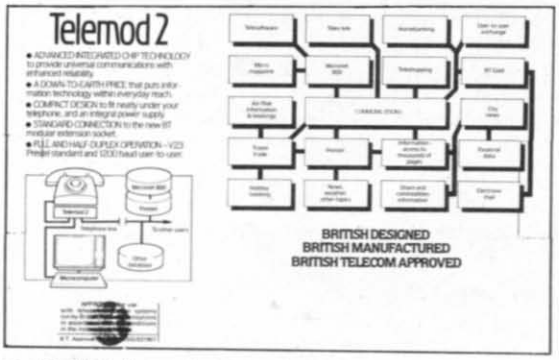
In this mode, your BBC is set up as 'Prestel look alike'. Other users can communicate with your computer exactly as with Prestel. They can browse through pages that you create using Linemaster.

Modems

The Linemaster ROM works well with all RS423 type modems, eg Telemod, Nightingale, Miracle etc. but not all modems support all the features of the Linemaster.

Telemod 2 Modem

The Telemod 2 is a high quality, mains powered, BABT approved MODEM for direct connect. This means that there are no rubber cups to fit the telephone into, but just a connection to a modern socket, with the telephone plugging into the back of the modem. The modem supports 1200/75 baud (V23) communications protocol as in Prestel and Telecom Gold.



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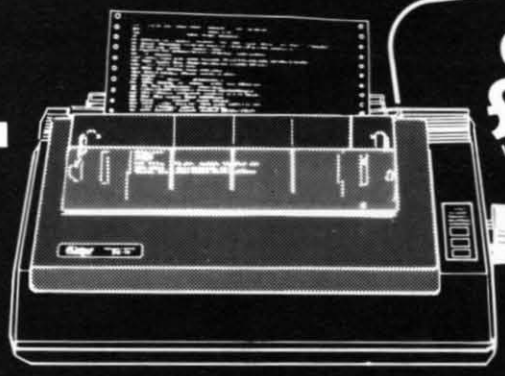

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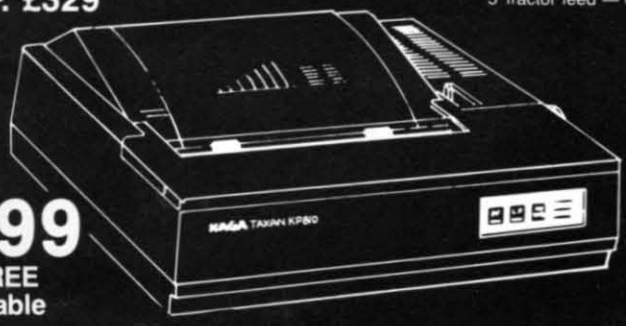

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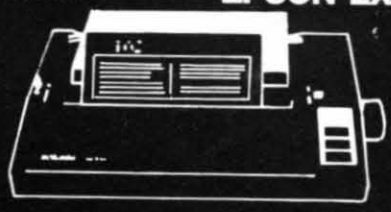

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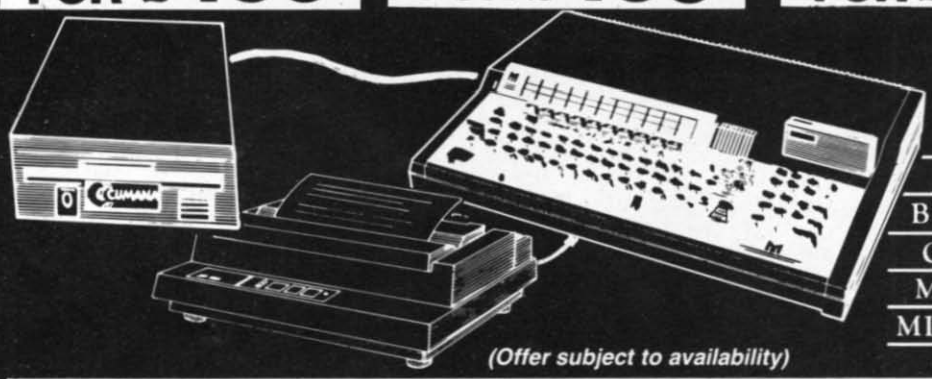

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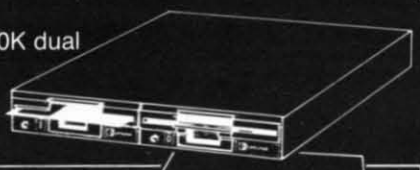

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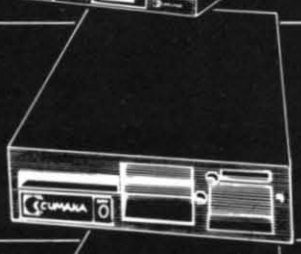

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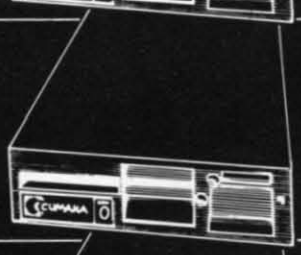

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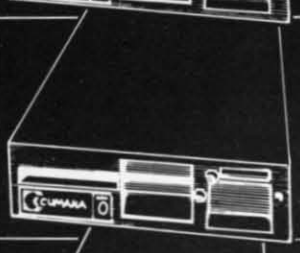

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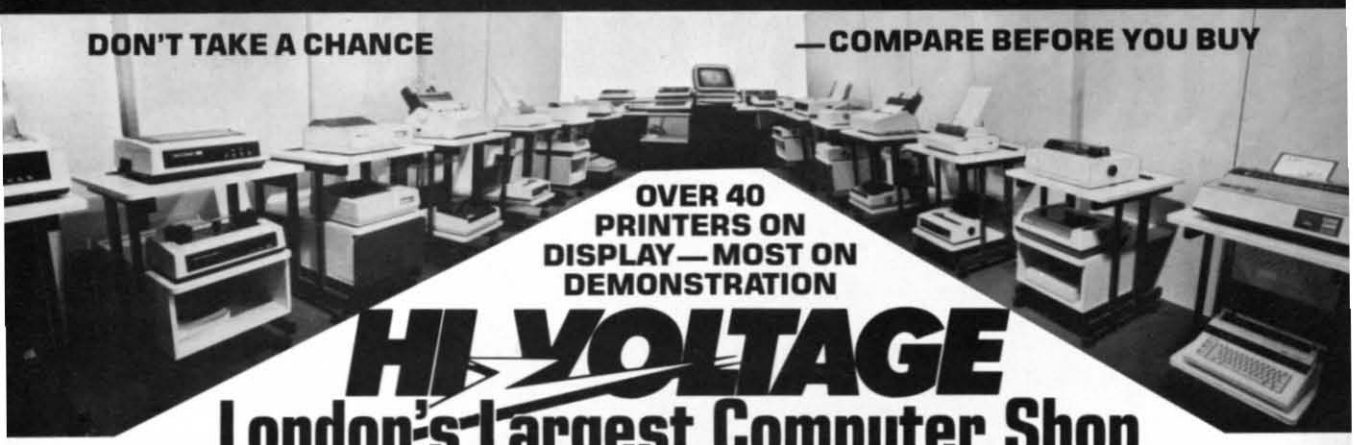

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Everyone knows that "first class" mail is far from perfect. The Consumers' Association reported in June that two out of every five first class letters fail to be delivered the day after they are posted.

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And how much does this ultra-fast service cost? From just £1.25 to send a letter of up to 350 words to any address in the UK (and an extra £1.70 to any address in the USA). You can also have it accompanied by a colourful greetings card (choose from 16 different varieties) for another 65p.

Telemessages is just one of many services offered by MicroLink that are designed to speed up communications. Find out more by returning the coupon below.

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THE MICRO USER NEWS
May 1986

Schools warned not to pirate software

HEADMASTERS at 90 schools have been warned about copying protected software programs on classroom BBC Micros.

The official letters to the schools in the Bury, Greater Manchester, area have been sent out after a pirated copy was spotted by Dave Clare.

It had been sent by a school to his Cheshire-based company, Clares Software, for an upgrade.

Mr Clare said: "There was no attempt at imitation. It was an ordinary disc with an ordinary label but it was from a protected copy of my Betabase program".

He sought the advice of Bob Hay, of the Federation Against Software Theft.

Satisfaction

"He told me to take it up with the education authority concerned to start with, and if there was no satisfaction to consider legal action", he said.

Following a letter from Mr Peter Graber, the assistant director of education for Bury, Mr Clare has agreed to accept their explanation and apology.

Mr Graber told *The Micro User:* "We have written to all the heads of schools in our area pointing out that unless the hand-out states a spare working copy can be made, they must not make any.

"We have given this assurance to Mr Clare following the misunderstanding.

"The disc was supplied to the school by the Information Technology Centre at Bury and was sent for an upgrade. The centre has also given an assurance that no copies must be made unless it is stated".

A satisfied Dave Clare said: "Although the software business is highly competitive, we are all fighting the same fight when it comes to pirating discs.

"This move by an education authority, circulating school heads, will be of great publicity value for our common problem, for any help will be good for the industry".

Halley's Comet encounter stars – on BBC Micro

AN estimated worldwide TV audience of more than 100 million people watching the encounter between British-built spacecraft Giotto and Halley's Comet saw the BBC Micro in a starring role.

A major contribution to the scientific feat was made by Professor Tony McDonell and his team from the space science laboratory at the University of Kent.

Data from their dust impact sensors mounted in the protective shield of the spacecraft was transmitted live to the European Space Centre in Germany for processing by BBC Micros.

Television image processing equipment designed and manufactured by Video Electronics enabled computer-generated images from the micros to be synchronised to the Eurovision television network.

Viewers were able to see dramatic BBC Micro-processed images of the comet's dust storm striking the spacecraft.

RECORD SORTER

THE List Manager, a new database from Microtest for the BBC Micro, automatically sorts records alphabetically by their first fields.

Records may be retrieved in file sequence or alphabetically without the need for slow sorting routines.

NEW PRODUCTS LINE UP FOR SHOW

MORE than half the exhibitors at this month's Electron & BBC Micro User Show will be offering entirely new products.

A survey carried out by *The Micro User* has revealed that at least 30 of the 50-plus leading firms which have booked stands intend to launch or demonstrate new hardware and software.

The show, which takes place at the Royal Horticultural Hall, London SW1, on May 16, 17 and 18, has attracted all the famous names familiar to BBC Micro and Electron enthusiasts.

Organiser Database Exhibitions says the speed at which stands and advance tickets have been snapped up indicates the show is on target to break all previous records.

Interest has been particularly stimulated by the arrival on the scene of the first of the new generation of BBC products – the Master 128 and Master Turbo Upgrade.

But the main thrust of the show will of course be directed toward the massive army of BBC Micro and Electron owners who have sustained Acorn and its third party suppliers through recent difficulties.

Their reward will be a stunning array of new software and peripherals, and bargains galore from exhibitors keen to clear their shelves to make space for the new products coming on to the market.

An important aspect revealed by *The Micro User* survey is that many of the new items not only represent significant technological advances, but are more reasonably priced than existing products in their fields.

Computer Concepts is releasing its new word processor Inter-Word, the latest in its suite of integrated programs for the BBC Micro.

All four programs in the suite, including the soon-to-be-available database, will be demonstrated as will "the fastest ever spelling checker for the BBC Micro".

Entirely silicon based, with all the work held on chips and no disc access involved, this program checks entire documents in seconds rather than minutes according to Computer Concepts.

Viglen is launching a series of 20 and 40 mbyte Winchester drives, said to be the only Acorn compatibles, priced £800 and £1,200 respectively.

Vine Micros is introducing its latest ROM for the BBC Micro. The Matrix ROM for

Turn to Page 24

There's so much at the show

From Page 23

engineers, mathematicians and scientists uses Basic commands in performing matrix operations and solving linear equations.

New versions of the company's tape-to-disc transfer utility Replay include those for the BBC B+ and Watford DDFS. A version for the Master 128 could be ready for the show.

Vine Micros is also expecting to unveil what it describes as "an exciting new development for the BBC Micro that will increase its power and ease of use".

Hantarex is introducing a new 28in colour monitor designed for classroom and lecture theatre, and a new version of its Hantarex Boxer-12 for high resolution monochrome graphics.

Visitors to the Zonefour stand will get the chance to test their ability to cope under stress. The company is interested in the commercial possibilities of a psychometric test devised by Guy's Hospital drug research unit and will be demonstrating its ability to register psychological changes.

The system may eventually be used to test ability in schoolchildren, senility in the aged, and stress factors in pilots, soldiers and police officers.

DataStar will be revealing its new Star printer the NL10, and expects its Magic Modem to have received BT approval by the time of the show. There will be a special show price on the Philips 7502 monitor.

Variety

Launched by CJ Micros will be the Multi-Font NLQ which allows any Epson or compatible, including Star printers, to print in near letter quality with a variety of type styles including gothic, shadow, italic and bold.

MultiFont is a ROM for the BBC Micro with data held on disc and is compatible with almost all software, in particular Wordwise and View.

Meadmore Distribution plans to demonstrate its video digitiser which allows a video camera or recorder to "talk" to the BBC screen.

It can freeze an image, take a slow scan and then rebuild the picture. A built-in light pen feature allows the user to modify the resulting image.

The interface, software and light pen package is expected to cost in the region of £65 – less than half the price of similar systems.

Computer Bookshops has taken on distribution of the entire range of BBC Publications and will have all the latest titles on sale, including Toolbox II, Mastering the Disc Drive, BBC Micro and the Small Business, and Mastering Music.

The BBC Advanced Disc User Guide from Cambridge Micros will also be on sale.

Norwich Computer Services will be offering the Complete Wordwise plus – a 400 page handbook – at a special show price.

The Loony Loco game from Kansas City Systems is four games in one on cassette for the BBC and Electron.

Relational

Minerva is launching System Delta for BBC Micros and Econet, an extension to BBC Basic which allows programmers to create their own programs "inside a week".

It is fully relational and can open up to five files at any one time and access and manipulate the information in these files using more than 150 commands.

System Delta comes with a card index application and Minerva says it will be demonstrating other applications at the show.

An improved version of Micro English which can change words on the spelling program so users can test themselves is launched by LCL Educational Software.

The 24 program course, aimed at all levels comes on two discs and a cassette.

Fearnleaf Educational Software is releasing a four program package which teaches children about life in Saxon and Norman times through historical situations.

Grafsales is introducing additional software for its unique all-British, graphics-cum-digitiser tablet Grafpad II.

A CAD package suitable for engineering, architectural and other design, DDX, will cost £143.

All three software packages for Grafpad II are now available on ROM for the BBC Micro and will be on sale at the show.

Glentop Publishers is releasing additions to its Graphic Calculus mathematics teaching series and is also offering Pocket Book Logo, a guide to all Logo commands costing £3.95.

Micro Aid is bringing out its Citizen 120D printer, compatible with BBC Micro and Electron.

"Once again it has been demonstrated that interest in Acorn products continues unabated", says Derek Meakin, head of Database. "The sort of excitement these shows generate can only be found within the BBC Micro fraternity".

£400 prize

BBC Micro users have a sporting chance of winning a real arcade machine worth £400. Incentive Software has included an entry form with its new release, Moon Cresta, the version of the arcade game by Nichibutsu.

The winner will be chosen in a draw of those able to score more than 30,000 points in the game which involves rocket ships and kamikaze-style aliens. The cost: £7.95 on cassette, £9.95 on disc.

More mice

NIDD Valley Micro Products has developed two versions of positive mouse control for the BBC Micro.

The Anamouse is designed to obtain positional accuracy for CAD, graphic art and tracing applications.

Also at the same price, £34.95, is their BBC Digimouse which gives accurate digital pulse output.

Memory expander

A NEW 256k memory expansion board from Palesar gives the BBC Micro four 32k shadow RAM banks for running programs, and handling large amounts of data, as in databases and word processors.

Having four shadow banks not only allows the screen memory to be moved out of program memory, but also provides the facility for rapidly switching between banks of memory which may each contain different programs or data.

In addition the eight 16k sideways RAM banks give the flexibility to load into the BBC an infinite number of sideways ROM images, loading the ROM software only as and when it is wanted.

The selection of the shadow and sideways RAM banks is under the control of four registers, located in a previously unused area of the computer's Sheila memory area.

Separate read and write registers are provided for both shadow and sideways banks. A printer output buffer in sideways RAM can be written to from a Basic program with no loss of execution speed due to bank switching.

None of the computer's facilities are removed by the Palesar board. Price: £99.

HELP US TO GROW!

Database Software is a constantly expanding enterprise and we're looking for new staff. If you're interested in a career in software development we want to hear from you. We're specifically looking for:

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Do you think you fit the bill? If so write for further details and an application form to:

Personnel Manager, Database Software, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

BEEB KEEPS TABS ON BEES

DAVID Channon's busy BBC Micro is a hive of information, swarming with facts on millions of bees.

David, 36-year-old chairman of Wimbledon Bee Keepers Association, and his wife, Hazel, the branch's Swarm Secretary, use the BBC Micro to run their pest control company – Microbee Ltd – in South London.

He explained: "It quickly provides names, locations and phone numbers of bee keepers who will take away swarms from public places or gardens when people become frightened".

Information is also stored about the flowering of various fruit crops in Kent where most of the bees are kept in hives ready to pollinate flowering crops.

David said: "This pollination is essential in areas where natural insects are scarce".

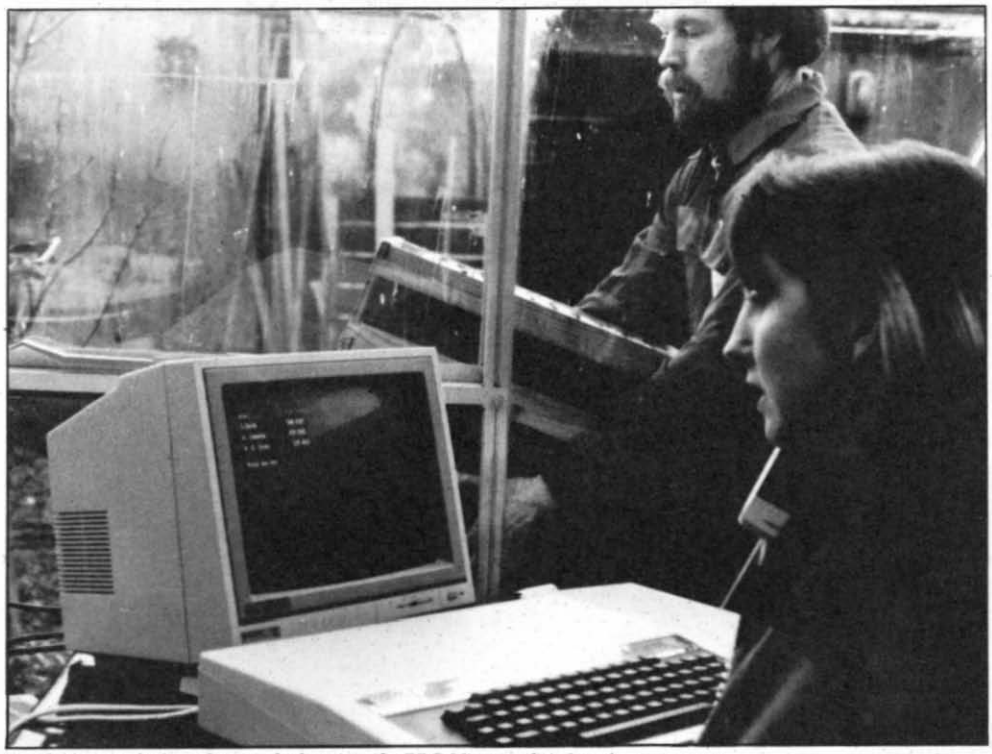
Also useful is the micro's constant check on the weight of the apiaries – which start the year weighing about 50 lbs but with the extra honey bees weigh well over 1 cwt.

Back at his office Inter-Sheet and Inter-Chart keep track of the firm's finances, with Wordwise Plus and the RX80 used for correspondence.

His MicroLink mailbox and telex allow clients to leave detailed instructions about pest control jobs or requests for specialist advice on insect problems.

With 50,000 bees to a colony, David has a total of around three million.

"For this company, to bee or not to bee is never the question. With the help of the BBC Micro it's simply a matter of where and when", says David.



Hazel Channon feeds in data on the bees into the BBC Micro at their home's conservatory which is used as an office. Her husband David is seen behind carrying part of a hive

Double display

THE simultaneous display of two sections is featured in Swift Spreadsheet, Audiogenic Software's release for the BBC Micro.

The pop-up menu system allows all commands to be accessed using the same three keys throughout.

The area of Swift is over 3,200 cells in an A1 to Z126 matrix. The screen is displayed in 40 column mode.

It comes on an eprom which supports both disc or tape files. Included in the package is a cassette with four ready-to-load application sheets covering loan figures, home budgets, car costs and expenses.

Price: £29.95.

Market expands for second-hand BBCs

A BIG second-hand market for the BBC B has sprung up. "The old micro is holding its price well. The hard core of its real fans want to stick with the model they know when they want to expand", said an Acorn spokesman.

In fact so many letters are coming into the Acorn offices, asking for BBC Bs, that Acorn is asking dealers who have machines to contact them so the writers can be advised where to make purchases.

At Comp Shop, in North London, Karen D'Arcy said: "We trade in about 10 micros a week. Virtually all customers want to stick with the BBC machine".

When an old BBC Micro is part exchanged for a B+ or Master, the second hand BBC B is swiftly snapped up.

Others want their machines up-graded for the extra memory of the BBC+ and Master.

Karen recommends that when making a part exchange any extras such as ROM boards should be taken out and if not needed sold privately.

The company is also up-grading the BBC B to a B+ or B+ 128 by swapping the board.

ART FOR SCHOOLS

THE Artist, from Wigmore is directed at schoolchildren who use BBC Micros for design, art and drawing. It operates in Mode 2 and all eight prime colours are available. Each pixel is addressable so hundreds of shades and patterns are to hand. It can be used with the newly released Megamouse and the combined package costs £99.90.

Primary drive

COMPUTER Concepts is hoping for a bigger share in the primary school market with its reduced-price Wordwise package for BBC Micro users.

It originally cost £46 but is now down to £36.80. Rob Pickering, the company's manager, says: "This move is designed to encourage the low end of the market, such as primary schools, who have little need for the extra facilities in Wordwise Plus and have smaller budgets".

Soon to be released is a new version of Wordwise, also costing £36.80.

Designated 1.30, it allows 80 column previews, even with the text memory full, when using the Model B fitted with Aries B20, B32, Watford 32k, model B+ or the new Master. It remains compatible with the standard model B and with Econet Level-2.

Micro mag that speaks for itself

BLIND BBC Micro enthusiasts can now enjoy each issue of *The Micro User* as much as their sighted counterparts.

The magazine has been added to the list of publications transcribed onto audio tape by The Talking Newspaper Association, an organisation serving Britain's registered blind and partially-sighted who cannot read ordinary print.

Each month a special tape containing news, reviews and articles from *The Micro User* will be prepared and made available to the Association's 10,000 subscribers.

"Everyone who is unable to read N12 type is eligible to receive these cassettes under the Articles for the Blind free postal facility", says association chairman Ted Davis.

"We are very grateful to Database Publications for giving us permission to put *The Micro User* on tape each month – we expect it to be a popular item on our subscription list".

The move was warmly welcomed by David Calderwood who runs a group of 40 BBC Micro users who, like himself, are blind.

"This is very exciting news and something I have been hoping would happen for a long time", he said.

"In the past unless our members were lucky enough to know a subscriber to *The Micro User* who was willing to read its contents aloud they missed out on a lot of important information about the BBC Micro.

"With so many interesting developments taking place – such as the introduction of the new Master series – it is vital that we blind BBC Micro users stay in touch.

"Putting the magazine on audio cassette is the best method for us to keep up to date".

Mouse sent packing

EXPERTS from Advanced Memory Systems, creators of the AMX Mouse, have enhanced the AMX Pagemaker package to make it mouseless.

The new version can be controlled by keyboard or joystick as well as by the mouse.

It does not require the AMX Art ROM, so two and not three ROM sockets are used so the mouse is no longer vital, although the company suggests its use is preferable.

Pagemaker combines typesetter, graphics and word processor on two ROMs and two discs.

It lends itself to anything that can be created on A4 size paper. It has shown itself to be of particular interest to the school and college newspaper market.

BRING IN A BUDGET

A CHANCE to run the country's economy as Chancellor is offered by McGraw-Hill Book Company.

The Chancellor for the BBC Micro gives an opportunity to control basic tax rates, the rate of value added tax, government expenditure and the money supply.

The objective is to give A level and undergraduate students the basic concepts of modern economics in an interesting way.

The price, £29.95, includes a copy of "Macroeconomics in Focus", which is available separately at £5.95.

PAPER-SAVING PRINTER

DATASTAR Systems has announced a new money-saving model to its range of printers.

The NL-10 Star printer has a plug-in cartridge interface for use with all models of the BBC Micro and enables the user to minimise paper wastage with its short form tear-off.

Aimed at the high quality business sector it costs £239, with the interface £39 and cut-sheet feeder £60.

New job for Herman

HERMAN Hauser, one of the co-founders of Acorn, has been appointed director of advanced research and development in the Olivetti group.

The move is a tribute to 38-year-old Dr Hauser who founded Acorn in 1981 and has always been in charge of research.

He was chairman of Acorn until March when Olivetti took up 49.3 per cent of his company's shares, increasing that to 79.8 per cent six months later.

Dr Hauser, with about a 7 per cent holding in the company, remains a non-executive director of Acorn Computers and will continue to contribute to research and development.

He is expected to move eventually from Cambridge to the Olivetti HQ in Ivrea, Italy.

Six from Clares

SIX new programs for BBC machines are being released by Clares Micro Supplies.

Fontwise Plus improves on Fontwise by supporting Mini Office II and View as well as Wordwise and Wordwise Plus.

New features include enlarged text, tabs, temporary indents, micro spacing between characters and lines and 12 fonts. Price is £20.

Macrom is a macro assembler for all BBC Micros including the Master 128.

It supports 65C02 codes as well as 6502 and enables assembly from memory to memory, disc to disc, disc to memory or memory to disc. Price: £40.

Brom Plus is another upgrade, containing sections dealing with discs and memory as well as utilities found in the previous Brom, including the full screen editor. Price £34.50.

Statement and Stock Control are two modules for Clare's Beta-Accounts series. They are part of an integrated accounting suite which is also compatible with the Beta-Base database and cost £25 each.

Finally, Educational Compendium contains six of Clare's best-selling educational programs on disc. It costs £12 for programs which retail separately for £32 on tape.

What you see, you get

A NEW word processor for the BBC Micro range from Scarlett Software allows users to see on the screen exactly what will appear on paper.

Underline, italic, superscript, subscript, emphasised, double strike and large type – or any combination – appear on the monitor without recourse to switching between modes to see what the result will look like.

The product allows single or double-column entry with word wrap and line wrap. It is designed for the Epson FX80 printer, but will work with many other types, thanks to its on-disc printer-driver design program.

The software runs on BBC Micros and the Master series and costs £17.50 on disc.

Karate can win £100

A £100 prize to beat a top karate expert is being offered by Superior Software to BBC Micro owners.

Karate Combat is a realistic fighting simulation game and includes two player and practice modes.

In addition to the prize money a trophy will be offered to the player who defeats the ultimate opponent in the game.

All the names of those who beat him will go into a draw.

Price: £8.95 on cassette, £11.95 on disc.

Books tend to stay on the shelves a little longer at Renfrew libraries nowadays

BBC Micro is biggest draw at library

CHILDREN and unemployed teenagers in the ancient royal burgh of Renfrew, Scotland, have a new reason for visiting their local libraries.

The district library service has installed BBC Micros alongside the bookshelves in four branches, and the machines are proving a big attraction for youngsters.

Each computer is provided with a cassette recorder, disc drive and monitor. Joysticks are available and modems and printers have also been bought allowing access to on-line bibliographic services.

Three of the four community libraries involved in the scheme stock BBC programs for use on library premises only. But the fourth offers a much broader range of computer-related services.

Known as Jill – after the initials of its full title, Johnstone Information and Leisure Library – it was opened in response to high levels of youth unemployment in the area and as an experiment to attract an age group which tends to avoid libraries.

Because of its dual social purpose, Jill dispensed with the usual membership fee for audio-visual borrowing and has more than 1,200 cassettes available for loan as well as 27 discs for use on the premises.

The experiment has proved such a success that a second BBC Micro has been installed at Jill and audio-visual materials account for more than two-thirds of the items borrowed from the branch.

"Eventually we hope to have a micro in each major library in the district, and in some cases more than one", says senior librarian Paul Weatherall.

"The software lending service at Jill should also be extended to all branches where there is a computer, with staff trained to help the public make use of the equipment and give general demonstrations of its facilities and capabilities.

"At present most library computer use is purely recreational, although a few individuals use the micros for programming.

"At one branch there is a computer club which uses the BBC Micro and also provides back-up expertise and advice to library staff when required.

"Another branch is running courses to introduce people to word processing using the BBC Micro and Wordwise Plus".

Trade watchdogs on alert for fake BBC B+ Micros

BRITAIN'S 1,400 watchdogs, the trading standards officers, have been alerted to the latest con trick in the computer industry – bogus BBC Micros.

The Micro User exclusively revealed in its last issue that BBC B+ machines were being offered which contained only basic model B motherboards.

It warned readers to watch out for the rogue machines after a nationwide probe showed that crooks, who have been doctoring the B+, have been raking in up to £100 a time.

Now the nation's 95 local authority offices and the government-controlled one in Northern Ireland have been circulated with the details on how the switches are being made.

A senior trading standards officer said: "We acted promptly when we read in *The Micro User* what was going on. We have now circulated every office in Britain and Northern Ireland to watch out for these cannibalised sets.

Ron Pennington, Principal of the Office of Trading Standards for Greater Manchester, has already appealed to the public to contact him should they find they have bought new models with old innards.

He has warned: "Given the evidence these operators could face two charges – each carrying a maximum £2,000 fine – for issuing a false trade description or selling goods not as new".

Mike Cook, technical editor of *The Micro User*, tells how to check if a BBC B+ is bogus.

"It would be wise to ask the dealer to remove the four screws holding down the cover of the keyboard. Inside, quite prominently displayed, is the issue number.

"In 1981 BBC Micros were numbered Issue 3, then came Issue 4, the following year. Finally, in 1985, came Issue 7 for the last B.

"Subsequently the new 65k B+ and the 128k B+ have been renumbered starting at Issue 1.

"Obviously B+ machines which are numbered anything but 1 or 2 are bogus".

BOOTS BOOST

BRITISH Educational Software Associates and 20 main branches of Boots have joined forces to promote home learning software.

Special educational software display units have been installed at Boots stores from Aberdeen to the Isle of Wight featuring programs produced by BESA members for the BBC range.

Viewdata software package

TEACHER and information manager of the Independent Schools Microelectronics Centre, Michael Bawtree, is the author of a new viewdata software package for the BBC Micro published by Woodhead-Faulkner.

Called Visifax, it enables owners of BBC Micros with Basic II and a 40 or 80 track disc drive to generate their own sequence of pages.

The package is designed to help even computer novices to write, or incorporate from external databases, material which can be displayed in full colour graphics on the system's 80 or 180 frames.

An automatic cyclical board is contained on the first 20 pages, providing a description of Visifax and instructions for its use. Once the system has been mastered the board can be used as a personal bulletin board.

Another feature makes it possible to access the information contained on a data disc on a central monitor by means of a touch-sensitive remote key pad.

This enables users to dial up pages without altering their content or interfering with the hardware.

The key pad is available as a supplement to the software package and can be made to meet specific requirements.

Price of Visifax is £150.

NEW BBC PRODUCTS FROM CLARES

BETA-ACCOUNTS £25
STATEMENT AND ACCOUNTS RECEIVABLE MODULE

This module uses the transaction files created by the INVOICE module to prepare statements at regular intervals. The statement run is totally automated once security backups have been completed and will save hours of work every month. The Accounts Receivable allows you to enter all outstanding debts for an account and it is then automatically kept up to date by the invoice program. All payments received are entered into the accounts receivable file and allocated against the outstanding account.

In addition to the time saving operations performed by this module you can also obtain valuable management information such as debtor lists, which can be printed together with telephone numbers. It is also possible to query any particular account and obtain an up to date picture of the position.

STOCK CONTROL MODULE £25

The stock control module is used in conjunction with the invoice program and is updated whenever an invoice is issued. It is then possible to automatically search the stock file for out of stock or re-order level items. Purchase orders can then be printed, automatically if required.

As with the Accounts Receivable there are many forms of management information available including stock numbers and values both numerically and as a percentage figure. This enables you to identify slow or fast moving parts easily.

A parts explosion option is also available for just £10 extra.

A twin double sided drive is required for the STOCK CONTROL module.

Ask for a full data sheet

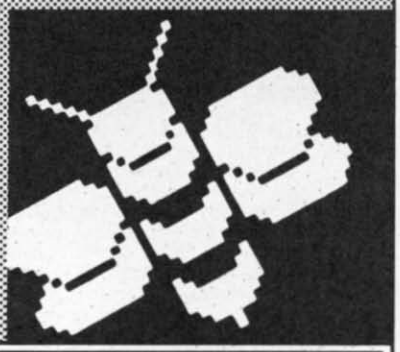
FONTWISE PLUS £20.00

Due to the phenomenal success of FONTWISE we just had to make FONTWISE PLUS compatible with VIEW as well as WORDWISE and WORDWISE+, at your insistence!

Now you can have PROPORTIONAL and JUSTIFIED text in 12 different fonts, all within the same document if required. In addition to the standard facilities like line and page length, pagination, left margin etc. we have now added

- Enlarged, standard & condensed fonts
- Tabs
- Temporary indent
- User definable line feed
- User definable character spacing
- Non proportional fonts
- Now with 12 fonts
- Plus many more features

If you are not convinced ask us to send you a sample printout and you will be amazed at the quality - requires an EPSON compatible printer capable of single, double and quad density graphics but you do not require any RAM in your printer to use FONTWISE PLUS.



MACROM £40
£35 DISC

MACROM is a fast full featured MACRO ASSEMBLER ROM that allows the use of macros, which are loaded from a macro library stored on disc. Assembly can be from disc to memory, disc to disc, memory to memory or memory to disc, thus allowing the use of very long source code up to the length of your disc. MACROM source code is tokenized and thus takes up far less room in memory or on disc than most assemblers.

- Operate in any mode
- Tokenized source code
- Assembles 6502 & 65C02 codes
- Automatically loads macros from library on disc
- Automatically loads subroutines from disc
- Macro library supplied plus demo files
- Chain program sections into main code
- Many different assembly options
- Converts BBC assembler code into MACROM source code
- Very fast & very flexible

In a comparison with ADE, MACROM was able to assemble a program to disc in 1 min 24 secs compared to 5 minutes with ADE and the source code took up 30% less room on the disc.
Ask for a data sheet today

BROM PLUS £34.50 — £30 DISC

BROM was yet another of our runaway successes and such has been the demand for extra features that we have now produced BROM PLUS. Most of the original BROM favourites are there plus a whole host of additional commands to aid you, the user.

Commands include:

- EDIT - a FULL SCREEN EDITOR, not to be confused with the line editor used in other toolkit ROMs
- ERROR ON traps errors and enters the EDITOR
- FIND all occurence of a string or keyword and enter the editor, TAB will find the next one and so on
- SCHANGE a search and replace facility
- LCOPY & LMOVE allow you to copy and move lines
- PACK is a very powerful routine which removes REMs & spaces and forms multi statement lines in a very intelligent way
- RENUM is a partial renumber facility
- XREF allows you to cross reference your program
- COMPARE a file against memory
- DEDIT a robust disc sector editor
- DFIND to search a disc for a string
- DGET/DPUT to load or save sectors
- FORM allows you to format up to 4 disc sides
- MENU to load programs from a disc with a BROM menu
- XCOPY to selectively copy files from disc to disc
- XDEL to selectively delete files from a disc
- MEDIT to view and edit memory - FAST
- ROMLIST lists all ROMs and their current status
- ROMON & ROMOFF which enable you to turn on/off sideways ROMs even after CTRL/BREAK.

"This is the best BASIC screen editor I have so far used."

MICRO USER August '85

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Superior secret agent..

RICK Hanson, boss of Leeds-based Superior Software, has been turned into a daring secret agent by a rival company.

Robico Software at Llantrisant, Mid-Glamorgan, have chosen his name for their new BBC Micro adventure game which has Rick trying to steal plans for a weapons system and escaping by submarine.

Robico say: "We chose the name at random, we did not know about the real Rick Hanson, honestly!"

The real Rick has had to take some stick. He said: "Normally I do not dive from submarines, not even on holiday.

"I have not seen their game but, from what I hear, my life style is not quite so exciting".

The cassette game, called Project Thesius – Rick Hanson 2, has been written with the aid of Midge, a message compression system recently released by Robico.

Artwork program

DESIGNED to employ the full capabilities of the 128k computer together with Acornsoft's graphics extension ROM, the Imagin.A artwork creation program for the BBC B+ and Master series has been released by Ibbotsons Design Software.

A document-based program, it does not place any limits on the number of pages or images which may be incorporated in a document.

Text is stored on disc in standard Ascii, Wordwise, Mini Office or View format rather than as a bit image, saving on disc storage and allowing text editing by word processor.

Reports, manuals and journals can be printed out complete with illustrations in a single print run, instead of one page at a time.

Price is £52 for 80 track or optional 40 track 5¼in single or double-sided disc plus user guide.

STUDY THE MARKET, ACORN IS ADVISED

IF Acorn wants to keep its place among the big three firms which account for over 80 per cent of home computer sales it must be more responsive to consumer needs, says a new industry survey.

Computer manufacturers must attempt some form of educational programme for adults as well as children, says market research analyst Mintel Publications.

The report blames consumer ignorance for the downward slide of home computer sales from £260 million in 1984 to £190 million last year.

"By the end of 1985 the three market leaders – Acorn, Sinclair and Commodore – had survived, but only just. They all suffered heavy losses following the ill-fated Christmas of 1984", says Mintel.

The report says consumers appear to have more confidence in the future of home computers than might be expected. But when Mintel asked owners how they used their machines, although 31 per cent said they bought a micro for their children to learn computing, 57 per cent admitted that the equipment was mainly being used to play games.

Mintel is optimistic about the long term future for home computers, but sees no end to the industry's short term problems – "manufacturers and retailers will still face resistance from consumers if they remain ignorant over a home computer's capabilities".

In the meantime, says the report, the market will continue to decline and prices will continue to fall.

"There is likely to be some trading up to larger, more sophisticated machines, such as 128k models, but this will not compensate for the market's overall decline", says Mintel.

The Mupados Recorder Tutor in action and, below, how the score appears on the screen

Music minus those practice moans

FROM the Land of Song comes a software audio system to remove the boredom of music practice.

Mupados at Lampeter, Dyfed, have brightened up home tutoring for all budding musicians with BBC Micros.

Their package, Micro Maestro, enables a soloist to follow music on the screen. This shows a bouncing ball on each note with a metronome counting out the beats.

When the piece has been mastered the player is ready for his concert debut as lead instrumentalist with full orchestral backing.

This is achieved by popping the cassette provided containing the work of professional musicians into an ordinary tape recorder.

The arrangement has pauses for the learner to come in with a solo instrumental piece.

Micro Maestro is a follow-up to the Mupados Recorder Tutor used in over 60 educational authorities.

Cenfyn Evans, a director of the Welsh firm, himself a talented trumpet player, said: "Micro Maestro is a joint venture between ourselves and Warner Bros.

"We have our own 16 track recording studio and believe the condensed version of our Recorder Tutor will really keep up the interest of any young player who normally become bored with day-to-day practice at home".

A good word for Speech!

A PROGRAM which enables BBC Micros to talk has been singled out for praise in front of ten million television viewers.

Speech!, from Superior Software, was described as "absolutely amazing" by Keith Chegwin, co-presenter of Saturday Superstore when it was featured on the programme recently.

And Fred Harris, best known for Micro Live, called Speech! "a knock-out" during the same show.

It had earlier been demonstrated on Micro Live, where it was put through its paces delivering tongue twisters like "power mowers are thoroughly tough though".

How does it work? It's author David Hoskins explained: "This system allows the user to type in English or phoneme phrases which are then spoken by the program – such as: **SAY Hello I am a speech synthesiser.*

"The command can be typed directly to the computer or put into a program. Speech! will translate this command and reproduce it through the BBC's speaker".

The BBC Micro version of Speech! costs £9.95 on cassette and £11.95 on disc.

MicroLink
in association with
TELECOM GOLD

No. 9 May 1984

NEWSLETTER

MicroLink slashes the cost of Telemessages

OLD-fashioned telegrams have been projected into the Electronics Age – in the form of Telemessages. The difference is that today you compose the message on your micro, transmit it over a phone line via MicroLink, and it is delivered by the postman the following morning, neatly presented in a distinctive, eye-catching yellow envelope that just demands attention!

The Telemessage service was originally introduced so that people could phone their message to the operator. You can still do this, but it costs £4 for up to 50 words.

Now, using your computer and MicroLink, it only costs £1.45 for up to 350 words! Which is sufficient for an average business letter – and a small price to pay if it means you beat the opposition to clinch that all-important contract.

What's more, for an extra 65p your message can be delivered inside an attractive greetings card.

So if you've almost forgotten your loved one's birthday, or it's too late to buy a card – or you've simply missed the last post – Telemessages can be a real godsend.

To ensure delivery by first post the following morning you have to send your message before 8pm. It is instantly transmitted, exactly in the form you keyed it in, via the MicroLink mainframe in London direct to the postal delivery office nearest the recipient's address.

There it is printed out, put into the special envelope, and passed on to the local postman for delivery.

It's as simple as that!

Until now you could only send electronic mail if your recipient also had a computer. Now you can send a Telemessage to any address in the UK – all 22 million of them. (And there is also a next-day service for any of the 90 million homes in the USA.)

What it costs to send a Telemessage:

	By phone	*By MicroLink*
Up to 50 words	£4.00	£1.45
Up to 100 words	£6.25	
Up to 150 words	£8.50	
Up to 200 words	£10.75	
Up to 250 words	£13.00	
Up to 300 words	£15.25	
Up to 350 words	£17.50	

YOUR chance to join MicroLink – Page 115

Takeover boosts e-mail service

BRITISH Telecom's takeover of Dialcom, the world's largest electronic mail service, has been welcomed by Derek Meakin, head of MicroLink.

"Dialcom has a head start over all the other companies engaged in electronic mail on a global scale and is in the best position to take advantage of the dramatic increase in international messaging that is now under way", he says.

"MicroLink will be able to benefit in many ways from the revitalised Dialcom that will result from BT's involvement.

"We can expect many technical developments that will considerably enhance the service we offer our subscribers".

Dialcom has been sold to BT by ITT, the US conglomerate, which has recently been divesting itself of a number of its subsidiaries.

Last year it had an income of $19 million from its 100,000 mailboxes in the USA and from the fees it charges its licencees, the largest of which is the UK's Telecom Gold, of which MicroLink forms part.

But its growing revenue still wasn't sufficient to stop Dialcom running up heavy losses.

BT is putting in its own management and expects Dialcom to be back in profit by 1988.

In addition to the USA and UK, other countries on the Dialcom network are Australia, Canada, Denmark, West Germany, Hong Kong, Ireland, Israel, Korea, Netherlands, New Zealand, Puerto Rico and Singapore.

Subscribers in all these countries can have instant communication with each other by electronic mail, in addition to other messaging services such as telex and telemessages.

Dutch delight..

DUTCH subscriber J.W. Bangert says MicroLink is the most painless way to communicate with friends and colleagues all over the world – and he should know because he's a dentist.

When he isn't filling or pulling teeth at his surgery in Spanbroek he can often be found at the keyboard of his micro.

"I use the fabulous MicroLink to communicate – that's what computers are made for", he says.

"As a dentist who is interested in computers I find the system is a good way to send letters to the USA and England very quickly.

"It also makes it easier to get answers to my questions about computing – it is sometimes very difficult to get computer information in Holland, as we are not so much into these things as you are in Britain.

"I have a lot of friends in England who I often surprise with a nice card on the Telemessage service and I'm also able to send fast messages to professional magazines and organisations like the Dental Association in America".

ELECTRON & BBC MICRO USER SHOW

The show that gives you the FIRST look at all the latest hardware and software now being produced for the BBC Micro and Electron

Friday to Sunday, May 16 to 18

Royal Horticultural Hall
Westminster, London SW1

Problems? Then this is the show where you'll find the answers! Leading experts in all aspects of the BBC Micro and Electron will be there to lend a helping hand – whether you're a beginner or an advanced user.

See the BBC Master 128 and Master Turbo Upgrade – first of the exciting new generation of BBC Micros

Show opens 10am each day. Closes 6pm Friday & Saturday; 4pm Sunday

Organised by Database Exhibitions

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Admission at door: £3 (adults), £2 (under 16s)

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Post to: ***Electron & BBC Micro User Show Tickets, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

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Winchester Disk Drive 30 MBYTES	£1850.00
IEEE Interface	£299.00
Music 500	£178.00

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10ft Lead Set	£29.00
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Econet Bridge	£199.00
Level I Fileserver 40 Track	£99.00
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Disc Drives

DISC DRIVES

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables.
All drives are 40/80 Track switchable at the front and have two years warranty.

5¼" Drives without P.S.U.

MD 400A Single 400K Double Sided	£105.00
MD 802C Dual 400K Double Sided	£189.00

5¼" Drives with P.S.U.

MD 400B Single 400K Double Sided	£129.00
MD 802E Dual 400K Double Sided	£235.00

SPECIAL

MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. £255.00

OPUS CHALLENGER B

A remarkable plug-in disk drive double density disc interface and superfast 256K RAM Disk with a full operating manual and unbeatable 2 year warranty. £240.00

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CSX 100 (100K) 1 x 40 Track Single Sided Drive Excl. PSU £79.35
CS X 400 (400K)1 x 80 Track Double Sided Drive Excl. PSU £113.85
CDX 800S (800K) 2 x 80 Track Double Sided Drive Excl. PSU £199.00
CS 400 (400K) 1 x 80 Track Double Sided Drive Incl. PSU £135.00
CD 800S (800K) 2 x 80 Track Double Sided Drive Incl. PSU £239.00
Mitsubushi (400K) Single Disk Drives Case 40/80 Track Switchable with two years warranty. £110.00

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Phillips BM 7522 Amber Screen	£95.00
Kaga KX 1202G Hi Res Green	£120.00
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Microvitec 1451 Ap Med Res	£293.25

Phillips CM 8501 STD Res Monitor with grey glass Screen RGB and Audio input £209.00
Phillips CM 8533 Med Res monitor with dark glass etched screen composite video input RGB and Audio Input. £289.00

SPECIAL OFFER

Mitsubushi 1404 Medium Resolution Monitor with 640 X 200 Pixels RGB available with IBM or BBC Leads. £239.00

Kaga Super Vision *III* £369.00
This display is designed for business use which provides both high-res monochrome (Green, Amber, and White reverse) mode and high-res Colour graphic mode all in one.
Optional tilt stand with Quartz Clock is also available. £25.00

TV MONITORS

Phillips 1114 colour TV/monitor with 14" tube offedring 10 Preselect channels RF CVBS and RGB inputs £199.00

BBC Upgrades

64K Upgrade Kit	£39.95
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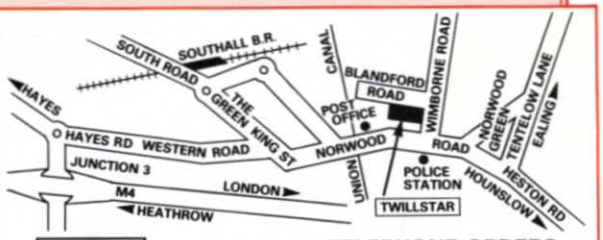

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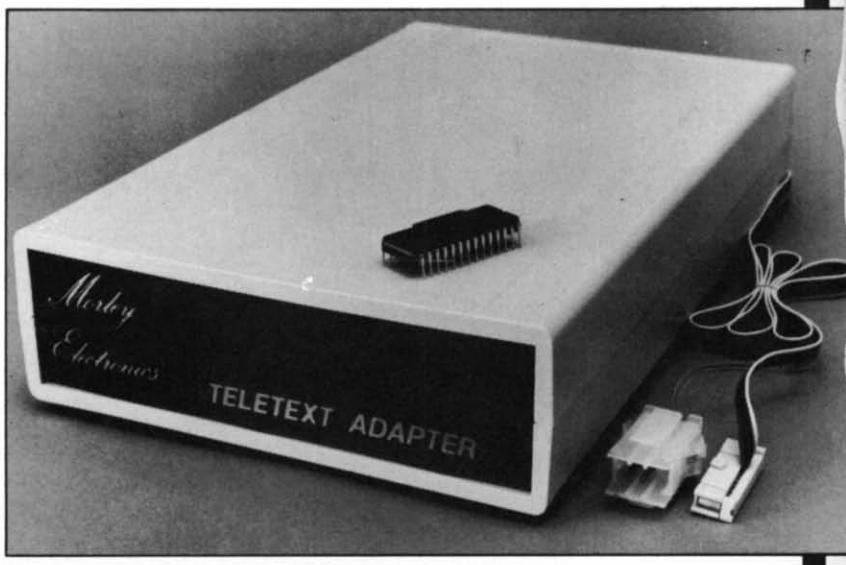
MORLEY ELECTRONICS



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- Advanced design uses the latest technology will handle ANY future enhancements to the Teletext system eg: full field: 8 bit data transfer: 2k pages etc.
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Electron adapter now available, including emulated Mode 7 allowing you to run long Adventure type programs. Please ring for Details.

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Easily the best value Mode 7 screen designer on the market today.
Design any mode 7 screen, from simple MENU pages to full CEEFAX standard. This program is an invaluable aid. Designs can be saved to disc as automaticaly numbered files or the program will convert the screen into a BASIC Proc.

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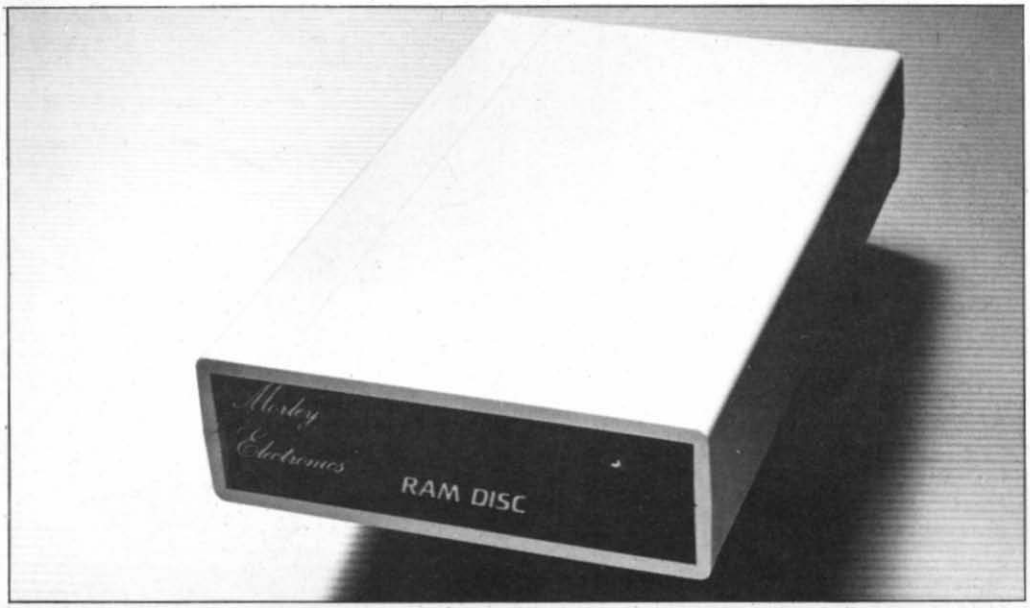

Now available the first true MEGA capacity RAMdisc for the BBC or MASTER computers.
This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, battery backup and a comprehensive user guide, add to this our usual 12 months no quibble guarantee and we're sure you'll agree Morley have done it again.

FEATURES
1 Megabyte of RAM connected to the 1 MHz bus.
Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase in speed, for example, a 20K mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc.
The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any DFS.
The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive no. is 4.
'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc are intercepted and the BBC's RAM from page 2 to &7FFF is saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The save operation delays the * command by just under 0.4 seconds. The BBC's RAM can also be saved by an interrupt-driven routine which can be enabled by a * command.
The 'filing system wedge' ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter, verifier and 'sector' editor for use with the RAMdisc.
Catalogue structure allows up to 2,709 files.

APPLICATIONS
Programs and ROMs can be written to take advantage of directly accessing a single RAMdisc, allowing the possibility of spreadsheets with more than 512 × 512 cells, million-character documents with immediate access and editing of any section, manipulation of 2 floating-point arrays each with 228 × 228 elements, a fast-access database with 10,000 100-character records, or even just a large printer buffer!
Accessible through the user's software for direct storage of eg: basic procedures, variables, large arrays etc which can be downloaded into the BBC's RAM or read directly. (We are hoping to be able to supply an extended basic ROM late this year, to allow 'transparent access' to the Ramdisc, which will effectively expand the BBC's RAM to about 1020k.)

OPTIONAL SIDEWAYS RAM UTILITY (suitable for use with any 16k SWR)
Sideways ROM images can be saved to the RAMdisc under a special directory which, when enabled, will be used when an unrecognised * command is trapped for the ROM to load sideways ROMs from disc into sideways RAM. The * command will then be passed to the new ROM image and if still unrecognised the next ROM will be loaded. If no ROM loaded from the RAMdisc intercepts the * command it will be passed to the current filing system as usual. ROMs on RAMdisc can be individually disabled in the same manner as 'real' ROMs in the BBC itself. Up to 104 8k ROMs can be saved onto the standard 1Mb RAMdisc, and the total load time (excluding time taken by the ROMs to process the command) for 100 ROMs is just under 9 seconds. All relevant control software for disabling/enabling ROMs etc. is provided. (Supplied on ROM.)

EPROM PROGRAMMER now available programs 8, 16 and 32k EPROMS connects to the user port software available on rom or disc.
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Acorn Cambridge Co-processor combines with the BBC micro to provide full 32 bit processing. The National Semiconductor 32016 processor performs all language and application processing, the NS32081 floating point processor maximises the performance and provides support for IEEE standard fp handling.

The specially developed operating system PANOS, provides efficient interfacing between the languages and the hardware and software of the BBC micro incl. the variety of ACORN filing systems: DFS, ADFS and NFS. PANOS provides a variety of utilities including a full screen editor and a linker providing acces to both library routines and cross language linking.

FORTRAN 77, PASCAL and C languages with mainframe type implementations, fully compiled and provided with appropriate library support are included. Other languages include, Cambridge LISP with its compiler, a 32016 assembler and a 32bit interpreted implementation of BBC BASIC with full screen editor. 1 Mbyte of RAM is included as standard.

32016 CO PROCESSOR (Currently available from stock) £1130 (a)

Please phone or write for full specifications on the Cambridge Co-processor and Cambridge Workstation.

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Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III is installed as standard on Acorn Winchesters. Non Acorn drives are fully compatible with the Acorn ADFS system and Torch Z80 system and offer a good value for money.

Acorn 10 Mbyte Winchester	£1100 (a)
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Technical Information:
1200/75 Baud. Standard Viewdata/Prestel Protocols.
Please note that a 'Prestel' type terminal must be used.

Now available for use. 01-452 1500
(Week days 7pm-9am, 24 hours Weekends)

EPROMs/RAMS

2764-25.....£2.00 (d) 27128-25 ....£2.50 (d)
6264LP-15.....£3.40 (d)

ACORN 2nd PROCESSORS

Acorn Z80 2nd Processor: Z80 CPU with 64K of RAM housed in a separate case with a integral power supply interfaces with the BBC computer through the TUBE. It converts the BBC into a CP/M system and its comprehensive package of software provides a suitable basis to set up a business system. £329 (a)

Acorn 6502 2nd Processor: This processor provides faster data processing speeds and larger memory. Particularly useful for use with Hi View word processor for production of large documents. £162 (b)

MULTIFORM Z80 2nd PROCESSOR

This processor converts your BBC into a power CP/M system and make it capable of operating in almost any CP/M format. Full details on page 5. £299 (b)

TORCH Z80 2nd PROCESSOR

ZEP100: This Z80 processor with 64K fits internally in the BBC computer and has the operating system in a ROM. It is supplied with the PERFECT suite of software comprising of a database, wordprocessor and a spreadsheet and a BBC BASIC for Z80. £199 (a)

TZDP240: ZEP100 with TECHNOMATIC PD800P dual drive with built in monitor £469 (a)

ACORN TELETEXT ADAPTOR

This adaptor will convert the BBC computer into a teletext receiver capable of decoding and displaying the CEEFAX and ORACLE pages and the monitor screen. These pages can also be saved for later reference. BBC TV transmit educational software on their CEEFAX system which can be downloaded free of charge. £125 (b)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £278 (a)

ROBOCOM BITSTICK

The renowned 'BITSTICK' graphic CAD package. Using the on-screen menu and colour pallette, it can draw freehand as well as lines and shapes with great accuracy. Any part of a drawing may be magnified many times, and up to 192 drawings may be saved on a disc. In total, a friendly yet sophisticated CAD system offering tremendous value.

ROBOCOM BITSTICK I £299 (a)

ROBOCOM BITSTICK II: This package is as Bitstick I with software upgraded to allow scaling and auto dimensioning. Multiplotter driver is also supplied with the package. £769 (a)

Upgrade for Bitstick I to II	£415 (b)
Bitstick Multiplotter Driver (most popular plotters included)	£69 (b)
Epson FX80 Screen dump routine for Bitstick I	£35 (d)
Epson FX80 dump for Bitstick II	£39 (d)

BBC COMPUTER SPARE PARTS (Carriage code (d)

Complete Keyboard	£52	6502A 2MHz CPU	£6.50	UPD7002	£5.00	74LS163	£0.75
Power Supply Unit	£52	65CO2 CMOS CPU	£12.00	DS3691	£3.50	74LS244	£0.80
Keyswitch	£1.75	6522 VIA	£3.50	7438	£0.40	74LS245	£1.10
Keyboard Connector	£4.00	6522A 2MHz VIA	£5.50	74LSOO	£0.24	74LS373	£0.90
Video ULA	£18.00	LM3 24 op-amp	£0.45	74LSO4	£0.24	74LS393	£1.00
Serial ULA	£14.00	SAA5050-Teletext	£9.00	74LS10	£0.24	8271	POA
UHF Modulator	£4.50	6845SP CRT Controller	£6.50	74LS123	£0.80	88LS120	£3.00

DISC DRIVES

Your computer installation can look like this with our PD800P drive

This highly successful drive offers unique features:

New slimline Mitsubishi mechanisms with ultra low power consumption (only 8 watts per mechanism), front locking lever and capable of single or double density operation. Ultra fast track access times and head settling times.

Fully compatible with the DFS and ADFS filing systems on the new MASTER's range.

40/80 switchable with switches located on the front panel. A generously rated switch-mode power supply ensures reliability with minimum heat dissipation for long periods of operation.

The mechanisms are set inside a sturdy monitor stand painted in 'BBC-matching' beige. Its 'looks' are enhanced by its black front panel, with attractive enamel-white markings.

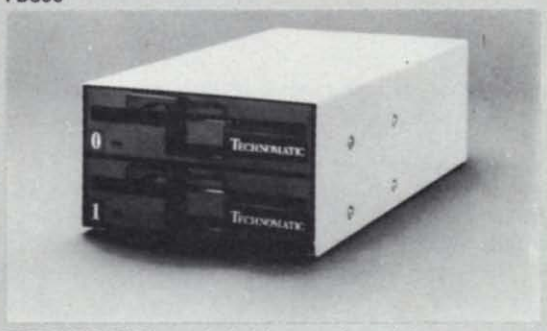
These disc drives with a built-in monitor plinth provide a compact installation and give a professional look to the system.

As with all standard TECHNOMATIC drives it comes complete with a data cable, and a mains lead with a suitably fused 13A moulded plug.

PD800P 2×400K/2×640K 40/80T DS **£289 (a)**

SPECIAL OFFER **A free pack of 3M 747 80T DSDD Lifetime warranty discs with every PD800P.**

PD800



TECHNOMATIC's stacked drives are housed in smart metal casings painted in BBC beige colour and are built to the same exacting standards as PD800P drives. The drives are fitted with integral switch mode power supply and supplied with a mains lead with a suitably fused 13A moulded plug and a data lead.

These drives are fitted with the new model MITSUBISHI mechanisms, which have been specially adapted for us to fit the 40/80 track switches on the front panel of the mechanisms. This would mean that the user no longer needs to grope at the rear of the drive to set the correct track setting.

PD800 (2 × 400K/2 × 640K 40/80T DS) **£269 (a)**

TD800 (as PD800 but without the psu) **£239 (a)**

TECHNOMATIC's single drives are also housed in metal casings painted in BBC beige colour and are offered with or without power supply. All drives are supplied with data cables and suitable power leads. Mains powered drives have a lead suitably fused with a 13A moulded plug.

1 × 400K/1 × 640K 40/80T DS

TS400 **£119 (b)** **PS400** with psu **£139 (b)**

SPECIAL OFFER

ACORN's Single Teac slim line Drive 1 × 100K/1 × 160K only £49 (b)

3.5" DRIVES

TD35 2

These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives are offered with or without integral mains power supply and they are supplied with all the necessary cables to make them ready for connection to a computer. Mains powered drives are supplied with a lead with suitably fused 13A moulded plug.

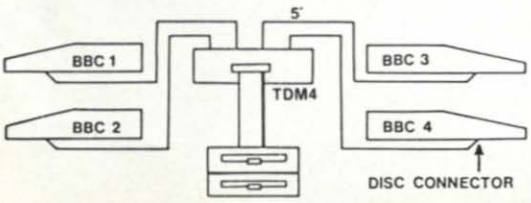
1 × 400K/1 × 640K 80T DS : **TS35 1** £115 (b); **PS35 1** with psu £130 (b)

2 × 400K/1 × 640K 80T DS : **TD35 2** £205 (b); **PD35 2** with psu £220 (b)

All drives listed above are fully compatible with single and double density DFSs. The larger capacity referred to above is for the Acorn's ADFS system.

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected together will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers) **£135 (a)**

TDM2 Dual Unit (2 computers) **£75 (b)**

3M 5¼" FLOPPY DISCS

40 T SS DD £10.50 40 T DS DD £12.75

80 T SS DD £14.75 80 T DS DD £16.00

£1 extra pack for library case packing

3M 3½" FLOPPY DISCS

80 T SS DD £18 (d) 80 T DS DD £25 (d)

Discs in packs of ten

FREE SWISS ARMY KNIFE for every 3 packs of discs

DISC STORAGE BOXES

NON LOCKABLE **DB530** 30 × 5¼" **£6.00 (c)**

LOCKABLE **DB340** 40 × 3½" **£8.50 (c)**

DB550 50 × 5¼" **£8.50** **DB570** 70 × 5¼" **£11.00 (c)**

DB5100 100 × 5¼" **£13.00 (b)**

Available at these new greatly reduced prices (for limited period only)

DRIVEHEAD CLEANING KIT

The **FLOPPICLENE** drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. 5¼" £14.50 (d)

Floppiclene with 20 disposable cleaning kits. 3½" £16.00 (d)

TECHNOMATIC

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BBC Computer & Econet Referral Centre

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RETAIL SHOPS
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London NW10 1ED
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(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
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24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

EPSON PRINTERS

EPSON LX-80 NLQ: A new low-cost high performance dot matrix printer from Epson. Its many features include Near Letter Quality, Draft mode, programmable characters, a variety of print styles, graphics etc. Supplied with friction feed as standard 100cps.

LX-80 £195 (a) Optional Tractor Feed £20 (c)

EPSON FX Range: This new range designed to meet virtually every type of computer based printing requirement, from correspondence quality (NLQ) text printing, a variety of fonts, to seven different levels of graphic printing. Fully IBM PC compatible with full graphics character set from the PC's keyboard. 8K built in buffer allows either data storage or creation of upto 240 characters of your own design. 160 cps for draft print and 32 cps for NLQ.

FX85 (80 col).....£315 (a) FX105 (136 col)... £449 (a)

EPSON JX80 4 colour printer..... £420 (a)

EPSON LQ Range: This range with 24 pin dot matrix printers offers a high, 200 cps, draft speed and superb correspondence quality print at 67 cps and truly high resolution graphics and a variety of fonts.

LQ800 (80 col) £595 (a) LQ1500 (136 col) 2K buffer £875 (a)
32K buffer £950 (a)

TAXAN PRINTERS

A set of economically priced printers that offers full EPSON compatibility and the near letter quality option and a facility to install 8K additional ram or 8K eprom for custom font. Both friction and tractor feeds as standard. 140 cps draft and 24 cps NLQ. A variety of fonts and graphics in six densities.

KP810 (80 col).....Reduced.....£160 (a) KP910 (156 col).....£339 (a)

DAISY WHEEL PRINTERS

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Proportional spacing * Underline * Bold * Shadow print * Super/Sub script + many other features.

BROTHER HR15 £285 (a)

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 £289 (a)

Integrex Colour Printer £569 (a)
BBC Colour Screen Dump £10 (d)

DOTPRINT PLUS

The most versatile NLQ rom for the BBC Micro.

DOT PRINT PLUS not only gives you the 10 character pitch at 6 lines/in with underlined and double width characters as required but unlike all other NLQ roms, it offers a lot more.

* a built in CHARACTER FONT EDITOR enables disc users to create their own type faces for use in printing spooled text files.
* a built in View Printer Driver.
* MICROSPACING for professional justification in VIEW and — with discs — in WORDWISE/PLUS.
* true BOLD PRINT in addition to double width.
* 12 char pitch as standard — providing 96 CHARACTERS PER LINE on the FX/RX 80 for example.
* simple control codes allow VARIABLE PITCH LINE SPACING in 1/72" increments and VARIABLE PITCH from 12 cpi in increments of 1/240". (10 cpi can be selected by a single control code).

In short this one rom not only will provide professional NLQ facilities, but also a view printer driver and a font designer/editor for only

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer.

Detailed leaflet on request.

Epson HI-80 Plotter £325 (a)

CENTRONICS GLP PRINTER

A NLQ printer at an affordable price. Fully compatible with Epson control codes offering a variety of fonts including super and subscripts, and a variety of graphic modes. Serial and parallel interfaces fitted as standard. Friction feed as standard. £109 (b) Tractor . £14 (d)

PRINTER BUFFER & SHARERS

BUFFALO 32K Buffer for EPSON PRINTERS: This compact 32K buffer can be fitted internally on most EPSON printers within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions.

Buffalo 32K Buffer £75 (d)

PRINTER SHARER/BUFFER: A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

Available in 64K and 256K versions

TSB 64 £199 (b) TSB 256 £275 (b)

A Serial Buffer/Sharer will soon be available. Please send for details.

PERIPHERAL & COMPUTER SHARERS

An extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69 (c)	25V25-3 £64 (c)
4 Computers to a Printer	36V36-4 £85 (c)	25V25-4 £74 (c)
2 Computers/2 Printers x-over	36V36-X £69 (c)	25V25-X £69 (c)
BBC Cable Set 3 to 1 (1m ea.)	£32 (c)	£34 (c)
BBC Cable Set 4 to 1 (1m ea.)	£39 (c)	£41 (c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50 (c)

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces:
8143 RS232.....£28 (d)
8148 + RS232 + 8K.....£75 (d)
8177P NLQ for FX80+/FX100+.....£99 (d)
8165 IEEE + Cable.....£65 (d)
8148 RS232 + 2K.....£57 (d)
8132 Apple II.....£60 (d)

Parallel & Serial Buffers of various size also available.

FX80/80+/85 Tractor Attachment.....£37 (c)
FX80/80+ Paper Roll Holder.....£17 (c)
LX80 Tractor Feed.....£20 (c)

SHEET FEEDERS:
8338 LX80.....£49 (b)
8333 FX100+/105.....£169 (a)
8331 FX80+/85..... £129 (b)
8330 RX80+.....£129 (b)

Ribbons:
RX/FX80/80+, FX85.....£5 (d)
LX80.....£4.50 (d)
RX/FX100/100+, FX105....£10 (d)
H180 Pen Set (Aqueous/Ball point).....£7.50 (d)

Dust Covers:
FX80.....£5.50 (d)
TAXAN/Canon KP810.....£6 (d)
FX100.....£7.50 (d)
KP910.....£7 (d)

TAXAN CANON Accessories:
RS232 +2K buffer.....£78 (d)
Ribbon.....£6 (d)

JUKI 6100
RS232 Interface.....£65 (d)
Tractor Feed.....£129 (a)
Ribbon (Carbon).....£2.00 (d)
Spare Daisy Wheel.....£14 (d)
Sheet Feeder.....£182 (a)

BROTHER HR15
Daisy Wheel.....£18 (d)
Tractor Feed.....£90 (a)
Ribbon (Carbon/Nylon)...£3.00 (d)
Sheet Feeder.....£182 (d)
Keyboard.....£135 (a)

Printer Leads:
BBC Parallel Lead (1.2m).....£6 (d)
BBC Serial Lead (1.2m).....£6 (d)
Other lengths can be supplied on order.
IBM Parallel Lead (2m).....£12 (d)

PAPER & LABELS
Plain Fanfold paper with micro perforations:
2000 sheets 9½" × 11".....£13 (b)
2000 sheets 14½" × 11".....£18.50 (£4.50)

Labels/1000:
Single Row 3½" × 1 7/16" £5.25 (d)
Triple Row 2 7/16" × 1 7/16". £5 (d)

MULTIFORM Z80

The MULTIFORM Z80 2nd Processor for the BBC Micro — opens the horizons of CP/M software to the BBC micro user

- Will enable running of almost any CP/M applications software
- Will enable transfer of data between different disc formats
- Emulates the two terminals most frequently used by CP/M software

MULTIFORM Z80 interfaces directly to a normal BBC micro requiring no hardware changes. It is supplied with OS/M operating system in rom which can run all software that obeys CP/M 2.2 constraints and its configuration is not hardware specific.

MULTIFORM Z80 is truly flexible and can be used with any BBC micro drive system, single or dual drive, 40 or 80 track format and single or double sided. Unlike other currently available Z80 processors for the BBC micro, there are absolutely no restrictions on the type of drive that can be used with the MULTIFORM Z80.

MULTIFORM Z80 plugs into the 1MHz bus connector of the BBC micro. It is mains powered and does not put any extra load on the BBC's psu. The data cable can be several feet in length, allowing convenient siting of the MULTIFORM Z80, unlike present second processors, which have 8" cables.

The formats supplied include: Acorn Z80, RML 380Z and 480Z, Torch (read only), Osborne, Televideo ... we also offer to configure other formats at an extra charge."

Rom based OS/M operating system is fully compatible with Acorn's single and double density disc interfaces. Installing the OS in rom allows more space on discs for programs and data and response to system commands is very fast. (Note: Single density DFS will only read/write to single density CP/M formats).

MULTIFORM Z80 can format, read or write from a very wide range of CP/M disc formats. On a dual drive system, the drives can be set up independently to run two different formats at the same time. This will enable:

- The user to buy software from a very wide range of suppliers without having to worry about the type of format supplied.
- Interchange of valuable data and files among users of various CP/M computers.
- Using a system at home for preparing data required in the office.
- Software writers/developers to write software in any one format and transfer it to any other format without having to pay for expensive porting charges.

MULTIFORM Z80 is supplied with a library of a number of popular CP/M formats and a utility disc containing a program for creating files for the additional formats. Each library can load 32 formats and there are no restrictions on the number of librarires that can be created.

The utility disc also contains a program to interconvert ASCII texts wordprocessed on a normal BBC and under OS/M or CP/M.

MULTIFORM Z80's terminal emulation includes the ADM-3A, the HAZELTINE 1500 and the BBC VDU making the installation of most of the well known CP/M software easy.

MULTIFORM Z80 converts your BBC computer into an almost universal CP/M machine and adds the power of being able to run two different formats simultaneously, which currently is possile on only the very sophisticated specialist machines.

For any one working or intending to work in a CP/M environment, MULTIFORM Z80 is an indispensable tool.

In offices where there are a multitude of CP/M machines and a few BBCs, MULTIFORM Z80 will prove to be invaluable for transferring data between the various CP/M machines.

MULTIFORM Z80 (including utility disc, library disc and manual) **£299 + £4 p&p**

(When ordering please specify the type of DFS, MULTIFORM Z80 will be used with)

SPECIAL MULTIFORM UTILITY to read and write to IBM PC Disc.

CP/M SOFTWARE FOR TORCH & ACORN Z80 PROCESSORS

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors. Phone for details on prices for popular packages for IBM

Please phone for our new professional software catalogue

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive friendly manual, step-by-step training guide, command cards, on-screen menus. Spellstar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering etc.

WORDSTAR PROFESSIONAL £310 (a)
WORDSTAR £275 (a) WORDSTAR Upgrade to W/S Prof £195 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation through to running accounting ledgers and payrolls. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data. Fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful.

SAGE ACCOUNTS: This package has been designed for the smaller business, for the user who is unfamiliar with computers but wanting or needing to computerise the bookkeeping and accounting functions. Sage is easy-to-learn and easy-to-use and is complete with a full tutorial booklet and a free manufacturers 90-day 'Hot-Line' support. It is a truly integrated package (all on one disc!) and covers Sales, Purchase & Nominal Ledgers, with a capability of handling up to 9999 accounts per ledger. It will handle all your Sales and Purchase invoices and can easily generate account & management reports. £375 **Sage plus** (£695) for the larger business, and **Sage Payroll** (£195)

Other packages available include PRO-PASCAL, CIS-COBOL, Supercalc II, MACRO-80 etc. Please telephone with your requirements.

A.T.I. Trainers — these superb interactive training discs simulate the package being studied. A unique screen technique provides a friendly interaction — in the upper area, a faithful reproduction of the screen is displayed, while at the bottom, a series of prompts and explanations lead the student through the exercise. ATI trainers available include Wordstar, dBase-II, dBase-III, Multimate, Multiplan, Word at **£75 (b)**. Please phone for other trainers.

TORCH GRADUATE IBM SOFTWARE: We are able to supply most popular software packages including: WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

PROFESSIONAL SOFTWARE PUBLICATIONS

Wordstar made easy	£16.95 (c)	Multimate Complete Guide	£16.95 (c)
Introduction to Wordstar	£17.95 (c)	ABC of LOTUS 123	£15.95 (c)
Wordstar Handbook	£11.95 (c)	The RS232 Solution	£17.95 (c)
dBase-II for the first time user	£16.95 (c)	CP/M Bible	£15.95 (c)
Understanding dBase-II	£22.95 (c)	Soul of CP/M	£14.95 (c)
Understanding dBase-III	£22.95 (c)	CP/M Handbook	£14.95 (c)
Multiplan Made Easy	£18.95 (c)	Mastering the CP/M	£17.95 (c)

(no VAT on books)

TECHNOMATIC

01-208 1177

BBC Computer & Econet Referral Centre

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London NW10 1ED
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(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COLOUR MONITORS

RGB MONITORS *(all monitors supplied with a BBC lead)*

1431 14″ RGB Std Res	452 × 585 pixels	£179 (a)
1451 14″ RGB Med Res	653 × 585 pixels	£229 (a)
1441 14″ RGB Hi Res	895 × 585 pixels	£375 (a)

MICROVITEC 14″ RGB/PAL/Audio

1431AP 14″ Std Res	452 × 585 pixels	£199 (a)
1451AP 14″ Std Res	653 × 585 pixels	£275 (a)

The above monitors are available in plastic or metal case.

MICROVITEC 20″ RGB/PAL/Audio
2030CS 20″ Std Res £380 (a) **2040CS** 20″ Hi Res £685

TAXAN 12″ RGB:
Super Vision III with amber/green option £345 (a)

MITSUBISHI XC1404 14″ Med Res RGB:
BBC/IBM Compatible. A new monitor with etched dark screen with both brilliance and contrast controls giving sharp graphics and text display. £249 (a)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software.
Touchtec 501 £260 (b)

EPROMER II

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass (27256 in two passes).
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Data input from keyboard/Tape/Disc/Eprom.
- Software interface for integration of user's special requirements.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.
- Enter OS Commands from within the epromer program.

EPROMER II with Manual & Software on disc £99 (b)
ROM based software £10

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59 (b)

UV1B as above but without the timer. £47 (b)

MONOCHROME MONITORS

KAGA

KX1201G 12″ HI-RES green etched screen	£90 (a)
KX1203A 12″ HI-RES amber etched screen	£105 (a)

PHILIPS

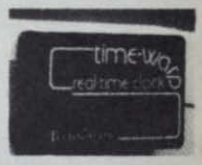
BM7502 12″ HI-RES green screen	£75 (a)
BM7522 12″ HI-RES amber screen	£79 (a)

MONITOR ACCESSORIES

Microvitec Swivel Base (14″ plastic monitors)	£20 (c)
Taxan Swivel Base for mono monitors with integral clock	£22 (c)
Philips Swivel Base £14 (c) Monitor Plinth	£13.50 (c)
Double Tier Plinth for flat drive, computer and monitor	£19.50 (c)
Taxan RGB Cable £5 (d) Microvitec RGB Cable	£3.50 (d)
Monochrome BNC/PHONO Cable	£3.50 (d)

REAL-TIME CLOCK CALENDER

A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as extensive software including a simple demonstration diary/planner application program on disc. £21 (d)



ROM/RAM EXPANSION SYSTEMS

ARIES B-32 BOARD: Features 32K of RAM and a 16K ROM socket. RAM can be configured as 20K or 16K as shadow RAM and 12K or 16K or 32K sideways RAM. New commands include comprehensive sideways ROM/RAM management system, simplified direct access to screen RAM and the ability to move/swap the contents of any area of memory. ROM/RAM management system allows RAM allocation, list ROMs, load sideways RAM, disable ROMs, and extend any buffer including printer buffer.

ARIES B32 RAM BOARD	£79 (d)
ARIES B12 ROM BOARD	£40 (d)
ARIES B12C Adaptor Board for B12	£7.50 (d)

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board £37 (d) Battery Backup Kit £18 (d).

ATPL Board for BBC PLUS 10 × 16K ROMs	£29 (d)
COMPUTER VILLAGE CV-16 Rom Board	£38 (d)

A neatly designed, simple to instal board allows full sideways rom expansion on the model B. Two sockets for 8K CMOS RAM allow a total of 16K for which battery back is fitted as standard. £35 (d)

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. No soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. Battery back-up fitted as standard. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £79 (b)

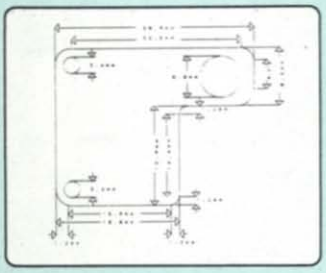
(Above boards are for use with standard BBC computer and not compatible with B plus unless specifically mentioned)

NOVACAD
Computer Aided Draughting for the BBC Micro

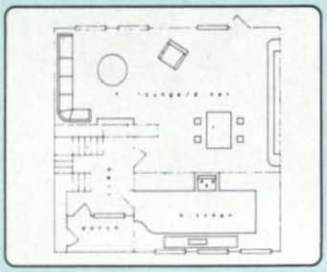
A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.

Whether you want to draw a complex electronic circuit diagram or plan your new kitchen or simply draw a cube NOVACAD will help you do it better and more easily.

All you need is a BBC micro model B fitted with Acorn DFs and a single disc drive. If you have a 6502 2nd processor and a dual disc drive NOVACAD's capabilities are further enhanced.



* Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. The drawing can be 4 windows across and 5 up.
* Libraries of user defined ICONS such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. ICON size is not limited to a number of pixels. An ICON can contain up to 500 lines, so complete drawings or sections of large drawings can be saved as ICONS for use with other drawings.
* ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.
* Shapes can be copied on the screen as many times as required.
* The zoom facility allows the user to magnify any section of a drawing by up to 20 times to make it easier to insert details.
* Horizontal and vertical displacements can be measured in any user defined scale.
* Any two colour can be used in mode 4.
* Up to '8 levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly used in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
* Text can be added at any position vertically or horizontally.
* Use of 2nd processor will allow use of any 4 colours, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
* An optional plotter utility contains a plotter configuration program allowing the user to configure a program for his plotter. Pre-configured programs are included for a number of popular plotters.



NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79 (c).

Novacd compatible with Tracker Ball/AMX Mouse £99 (c)

Stand Alone Mouse for use with NOVACAD £34 (d)

Upgrading of existing ROMs and DISCS £20 (d)

Plotter Utility Program £28.50 (d)

NEW META VERSION THREE

Now Available

* **Assembles for even more processors**
* **Now over 70k long on 2 Roms and 2 Discs**
* **Dozens of new options, features and directives**

The Original META system sold hundreds worldwide; it's being used in Universities, Polytechnics, British Telecom, the BBC, the MOD etc etc.

Now there's an even better version. It comes on two Roms and two Discs for your BBC or BBC+ (Master soon) and gives you complete Editing and Assembly facilities for all the listed processors:

1802	68HC11	6808
HD 64180	68000	6301
Z80	8048 Series	6303
6502 (including *all*	8051 Series	6305
CMOS varients)	8080	6801
65C812	8085	6803
65C816	Z8	6805
6800	68120	6804
6802	68121	6809

META uses the appropriate standard mnemonics for each, eg. LD (HL) 0ABH in Z80 and MOVE. B DO, $S0 (A5, D6.L) in 68000 etc.

Full nestable Macro facilities are provided, and nestable conditional Assembly, (IF/ELSE/ENDIF), Modular source code (including parameter passing). True local and global labels, 32 bit labels and arithmatic (incl. MIL, DIV, AND, OR, XOR, SHL etc). 30 ways to send object code during Assembly, including Intel Hex, S.Record, Binary etc to Disc files, RS423, EPROM emulators etc, local reassembly and over 50 directives, including DS.X, DC.X, EQUX, FCB etc).

Incredible Wordwise-style Editor integrated in with Assembler; Search/Search-Replace, Block copy/delete, markers etc; dozens of special features and functions for Assembly code programmer. Fast and Friendly to use.

Plus special new serial Communicator Area with Complex Option page etc.

Send for your 8 page datasheet on the META Assembler and the PORTAL EPROM Emulators. Set of disassemblers and Logic Analyser coming soon. £145 (c)

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London NW10 1ED
Tel: 01-208 1177
(close to Dollis Hill ⊖)

West End Branch
305 Edgware Road
London W2
Tel: 01-723 0233
(near Edgware Road ⊖)

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24 hour Viewdata Service 01-450 9764

Orders welcome from government depts & educational establishments.

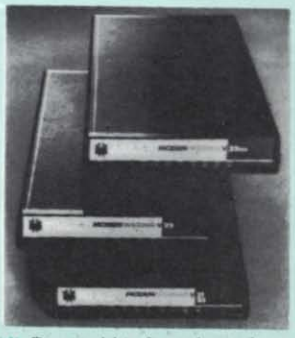
All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

COMMUNICATIONS

MIRACLE WS3000 Range: * A new, professional series of intelligent modems with full auto dial and auto answer facilities as standard. * HAYES protocols are implemented allowing the use of a wide range of well proven communications software. 'Plain English' command structure simplifies the use of the modem even for the first time user. * All models feature a centronics compatible printer port allowing direct output to a printer. * A line sharing facility that allows WS3000 to differentiate between calls intended for data, and those for speech. * An intelligent speed buffered RS232 port and a wide range of available data rates makes this one of the most powerful multi speed range of modems available. * Line noise filtering ensures error free transmission and reception of data on long or noisy lines. * Internal battery backup allows storage of 63 names and telephone nos. * This range of modems can be factory fitted with high security data access protection system. * Models V2123 and V22 can be factory upgraded to V22bis standard giving a single compact modem capable of data rates from 75bps to 2400bps.

APPROVED for connection to telecommunication systems specified in the instructions for use subject to the conditions set out in them.



WS3000 V21/23: This modem complies with the CCITT V21, V23 and Bell 103 standards and operates at CCITT standards for 300bps, 75/1200bps, 1200/75bps full duplex, 600bps and 1200bps half duplex, and the Bell standard for 300bps full duplex. £295 (b)

WS3000 V22: This modem operates on all V2123 standards plus V22 standard for 1200bps full duplex V22bis standard. £495 (b)

WS3000 V22bis: This modem operates on all V21/23 and V22 standards plus 2400bps full duplex. £650 (b)

BBC Data Cable for WS3000 £6 (d) Data cables for other micros available.

MINOR MIRACLES WS2000 This highly successful world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. **WS2000** £125 (c) Data Cable £7.

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30 (d).
BBC User Port cable (for modem co[illegible]) £4 (d)

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

SK1 KIT (Allowing total control of the modem by your computer) £10 (d)

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols for autodialling £10 (d)

GEC DATACHAT 1223 Modem: An economically priced BABT approved modem complying with CCITT V23 standard capable of operating at 1200/75bps and 75/1200bps and 1200/1200bps pseudo full duplex. It is line powered does not require external power source. It is supplied with software suitable for connecting to PRESTEL, Micronet 800, Telecom Gold and a host of bulletin boards. £86 (b)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. £24 (d)

COMMUNICATIONS SOFTWARE

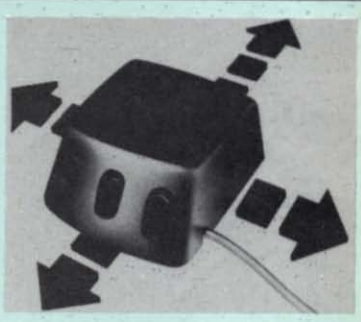
CONNECT-3000 AN ESSENTIAL UTILITY FOR THE WS3000 OWNER — a dedicated control package specially written to optimise the potential of the WS3000 series of modems. It provides a friendly menu-driven 'front-end', for the superb but rather complex multitude of facilities of the 3000 — no need to remember register nos. or complex command codings etc. It provides easy control for Prestel, Terminal, Auto-Answer/Dial use, while a unique 'default' facility provides automatic, pre-defined screen presentation. Works in conjunction with ALL communication software, including Commstar, Data-Beeb, Termulator, Termi, Communicator etc.
40/80 Disc £16.50 (d)

TERMULATOR An advanced terminal emulator on a 16K Rom. Emulations include VT52/100, Tektronix 4010 etc. Allows a BBC to be used as a terminal for almost any mainframe computer or computer network. £25 (d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £49 (d)
RS232 Solution (Book) £15.95 (c)

COMMSTAR An ideal communications rom for both Prestel and bulletin boards. Facilities include Xmodem, clock etc. £28 (d)
RS232 Solution Book £17.95 (c)

AMX MOUSE with SUPERART



The mouse will now be available with enhanced software, the 'SUPER ART' which is compatible with 6502 2nd processor, the ARIES RAM board, BBC+ shadow mode, tape and ACORN DFS and ADFS. Allows full use of colour in mode 1. Disc users can create colour pictures in A4 size with dot pattern editing, use of icons, additional text styles, superb zoom in colour.
There is a variety of optional software to make the mouse one of the most versatile peripherals that can be added to the BBC micro.

AMX Mouse with Super Art £67 (d)
AMX Super Art Package on its own £43 (d)
AMX PAGEMAKER provides a high resolution A4 Typesetting and Artwork system. £43 (d)
AMX 3D ZICON will let you transform three dimensional vector data and translate them into 3D on screen graphics. £21 (d)
AMX DATABASE is a new filing system with 1000 records per file and unlimited number of fields per record. £21 (d)

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.
RB-21 (with 'icon artmaster'). £59 (c)

MERLIN

NEW

A new advanced disc-users utility.

This 16K rom-based utility is one of the most comprehensive packages offering many unique features. Its over 50 commands are all fully tube compatible. It is supported by a 100 page manual. This package is aimed primarily at disc users with the BBC B and the B plus. (Master version available soon).

Major Features:

DISC UTILITIES including:
Disc editor, with search, verify and repair utilities. Clone utility, backup/edit of protected discs. A special formatter to speed up disc accesses. Tape archive of discs and tape/disc transfer utilities. Screen compaction. Vastly improved copy and backup facilities.

MACHINE CODE UTILITIES including:
Memory search and edit, disassembly with 65C02 codes supported, switching between roms, main memory and tube, examine fx and osbyte calls.

MERLIN £37.50 (b)

Send for the detailed command listing.

FIRMWARE AND SOFTWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £39 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. £49 (d)

MASTERFILE II The new version of the popular general purpose file management system allowing large amounts of information to be stored and processed. It allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. This latest version features many new facilities including use with WORDWISE/VIEW **£17.00 (d)** Disc (80 or 40T).

GEMINI'S DATAGEM £59 (c)

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. £39 (c)

VIEW VERSION V3.O Also compatible with BBC + Complete with Printer Driver Generator. £60 (c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £36 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £10 (d)

VIEW PRINTER DRIVER GENERATOR: This driver generator will enable you to produce a driver to suit your printer and also let you view the text as it will appear on the paper including condensed, italics, sub and super script modes. £8 (d)

VIEWSPELL: A rom based spelling checking utility with a dictionary of 70,000 words on disc. Additional/specialised dictionaries can be created. Facility to search the dictionary for words beginning with or ending with certain characters. £52 (d)

WORDWISE £28 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £45 (d)

WORDEASE A rom based utility for the Wordwise plus. £24.50 (d)

SPELLCHECK III A 16K rom based program for View and Wordwise plus. Contains 2000 words on the rom and 6000 (expandable to 17000) on disc. £31 (d)

EDWORD II £43 (a)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £39 (d)

VIEWPLOT: A disc based Linear graph/barchart/piechart plotting program. £25 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £45 (c)

INTERCHART Graphics Package for the Intersheet. £30 (d)

ULTRACALC £49 (d) **QUICKCALC** £14.50 (d)

LANGUAGES

META-ASSEMBLER: For full details please see page 6 advertisement.

Meta-Assembler £145 (c)

ACORN P-SYSTEM A portable operating system supplied complete with USCD PASCAL and FORTRAN 77. £259 (b)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6502 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £39 (d)

ACORN MICRO-PROLOG: The logic programming language seen as the language for programming in the future and used extensively in the artificial intelligence field. A simple 'front end' is supplied to make syntax more user friendly for new users. 16K Rom, manual and extension modules. £62 (c)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £48 (a)

ISO PASCAL Stand ALONE GENERATOR: Utility to convert programs produced using ISO PASCAL for stand alone applications. £28 (d)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £49 (b)

LOGOTRON logo £56 (c)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £46 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (d)

BCPL STAND ALONE GENERATOR £39 (d)

Acorn LISP Rom, Acorn FORTH Rom, Acorn COMAL, (each) £39 (d)

MICROTEXT A frame based authoring system from National Physical Laboratory for interactive computer tutoring. Disc based. **Disc** £49 (c)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. £39 (d)

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. (Specify 40/80T) £35 (c)

UTILITIES

ACCELERATOR £49 (d)
ACORN BASIC EDITOR £24 (d)
BROM £28 (d)
SLEUTH £24 (d)
TOOLKIT plus £31 (d)
EXMON-II £22 (d)
HELP II £27 (d)
DISC DOCTOR £26 (d)
DISCMASTER £18 (d)
ACORN GRAPHICS ROM GXR £23 (d) **(specify BBC B or BBC B PLUS)**
COMPUTER CONCEPTS GRAPHICS ROM £22 (d)
PRINTMASTER £26 (d)

DUMPMASTER II 16K rom with dump routines and a variety of features for about 40 different printers. £26 (d)

FONTWISE £10 (d)
HERSHEY CHARACTER FONT GENERATOR £18 (d)
ICON MASTER £29 (d)
STAND ALONE MOUSE £34 (d)
BILLBOARD £18 (d)
STUDIO EIGHT £19 (d)
ACORN'S CREATIVE SOUND £15 (c)
CC SPEECH ROM £28 (c)
ACORN'S SPEECH PROCESSOR ROM £15 (d)
ROMIT £29 (d)
PROGRAM BUILDER £18 (d)
REPLICA III £12 (d)
DATABEEB £24 (d)
COMMUNICATOR £49 (d)
COMMSTAR £26 (d)
TERMULATOR £25 (d)

When ordering software on disc please specify track format (40/80)

BOOKS

No VAT on books; Carriage (c)

CPU/ASSEMBLY LANGUAGE BOOKS

6502 Assy Lang Prog	£19.95
6502 Programming	£16.95
8086 Book	£23.95
Advanced Z80 M/C Prog	£12.95
Programming the 8086/88	£16.95
Programming the 6809	£15.95
Programming the Z80	£19.95

PROFESSIONAL SOFTWARE PUBLICATIONS

CP/M Handbook	£14.95
Mastering the CP/M	£17.95
CP/M Bible	£15.95
Soul of CP/M	£14.95
Wordstar Made Easy	£16.95
Intro to Wordstar	£17.95
Wordstar Handbook	£11.95
dBase II for the 1st Time User	£16.95
Understanding dBase II	£22.95
Understanding dBase III	£22.95
Multiplan Made Easy	£18.95
Multimate Complete Guide	£16.95
ABC of LOTUS 123	£15.95
The RS232 Solutions	£17.95

LANGUAGES

Understanding UNIX	£18.45
UNIX User Guide	£19.95
The UNIX Book	£7.50

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Orders welcome from government depts & educational establishments.

All prices ex VAT
Prices are subject to change without notice

Please add carriage
(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

EDUCATIONAL SOFTWARE

We are pleased to announce that we now stock the full range of BBC Publications Educational software for the BBC computers. This software which is in many cases developed alongside radio and TV programs from the BBC Education Department, has all been tested in many schools, and by education experts to ensure the high quality one would normally expect from BBC. These packages supplement the class room learning by providing moving and colourful graphical displays which normally cannot be easily produced on the blackboard and help in ensuring clear understanding of a variety of subjects. The software has received wide acclaim from teachers, and in the educational press. All cassette programs transfer easily to disc, and all disc programs can be run on 40 or 80 track drives.

PRIMARY LEARNING

ASTRONOMY
Aimed at the 9-12 age group, programs include Phases of the Moon, Eclipses, Seasons of the Year, Planetary Motions and Lander which is a gravitationally accurate game. All programs feature colour graphics [D] £12 (d)

COMPUTERS AT WORK: THE WORK GAME
Uses the technique of computer synchronised audio to illuminate two of the most important applications of computers — robotics and information technology. Includes a complete database program, tutorial on word processing principles, and robot control program driven by a logo-type language.
[D] EC £13 (d)
[C] EC £17 (c)

DRAWSTICK
For children aged 8 upwards allowing them to create pictures, charts, maps and diagrams. It is sufficiently sophisticated for use by older children and adults. Pictures are saved in a compressed form, and can be incorporated in your own programs. Uses keyboard or joystick.
[D] £9 (d)

INTRODUCING GEOGRAPHY
Four exciting graphic adventure simulations to bring geography to life for the 9-13 age group. River involves navigating a river's course to the sea. In Flight, you fly an aircraft round the world. Summit takes you up Mount Everest, and Nomad involves survival in the desert.
[D] £17.20 (d)

MATHS WITH A STORY 1
Four primary-level maths programs suitable for children of a wide range of abilities. Topics include symmetry, co-ordinates, and probability.
£9.50 (d)

MATHS WITH A STORY 2
These further four maths programs are for the same age/ability range as pack 1, and cover similar topics, from different angles. £9.50 (d)

NUMBER GAMES
Six maths programs designed to please the eye and stimulate the mind of any active and adventurous child aged 8 upwards.
EC £8.65 (d)

USING YOUR COMPUTER
A friendly and original introduction to computers using the computer synchronised audio technique. Written for a 8-12 year old but also suitable for any complete novice. Total of 80 minutes of audio material and 14 programs.
£26.00 (c)

WORD PLAY
An elegant but simple program to introduce primary school age children to the concept of word processing. Search, delete, justify etc have small animal icons associated with them. Fun manual for small children. £10.75 (d)

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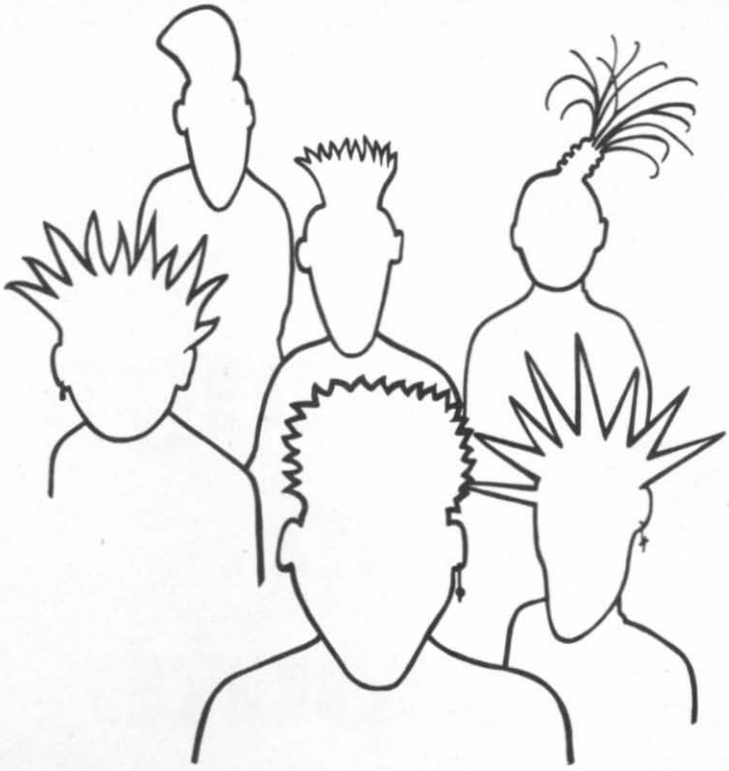

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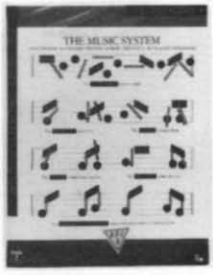

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SYSTEM SOFTWARE

Sum, strings and inputs

Part 5 of PETE BIBBY's series for the micro novice

ARMED with all the facts from the first four articles in the series you should find Program I quite straightforward:

```
10 REM Program I
20 LET answer$="The answer is "
30 PRINT "Give me a number"
40 INPUT firstNumber
50 INPUT "Give me another number "
secondNumber
60 result=firstNumber+secondNumber
70 PRINT firstNumber"+";secondNumb
er"=";result
```

Program I

First it uses LET to store a string of characters in the string variable *answer$*. Next it uses two INPUT statements to take values from the keyboard and store them in the numeric variables *firstNumber* and *secondNumber*. Line 60 (which avoids the optional LET) adds the two numbers and stores the result in *result*. The next line displays the sum for all to see.

Suppose that in these troubled times you weren't content to just add numbers together but wanted your micro to display an apocalyptic message. Program II is such a prophetic one.

```
10 REM Program II
20 message$="The end of the world
is nigh"
30 PRINT message$
40 PRINT message$
50 PRINT message$
60 PRINT message$
70 PRINT message$
```

Program II

Again it's easy to see how it works. Line 20 ensures that *message$* holds the message while the next five lines print it out. However, this method seems a bit long-winded and unsatisfying. After all, lines 30 to 70 are exactly the same apart from the line numbers. Wouldn't it be nice if there was a way to tell the micro to obey the:

```
PRINT message$
```

five times without needing to enter the line five times, one after the other? What's needed is a way of repeating bits of a program over and over. Basic has such a construction, it's called the FOR ... NEXT loop which is the subject of the next few paragraphs.

Program III is our prophet of doom program again, only it's changed. Now the message is coming to us five times via a FOR ... NEXT loop.

```
10 REM Program III
20 message$="The end of the world
is nigh"
30 FOR loop=1 TO 5
40 PRINT message$
50 NEXT loop
```

Program III

You'll notice that while I talk of FOR ... NEXT loops, the FOR is on one line (line 30) with the NEXT on a separate line (line 50). You can look on these two keywords as markers telling the computer that everything that comes between the FOR and the NEXT is to be repeated. Figure I shows this diagramatically.

In the case of Program III there's only one statement sandwiched between the two, so it's only:

```
40 PRINT message$
```

that gets performed again and again.

So now we know how to mark out the bits of code we want the micro to repeat but we've yet to deal with how we tell it the number of repetitions we want. This is done by the code that comes after the FOR, in this case:

```
loop=1 TO 5
```

loop is a variable and, as it controls the number of times the loop cycles, it's known as the loop control variable. As we know, the good thing about variables is that they do just that, vary. And as *loop* varies in value from 1 to 5, going up by one for every repetition of the loop, so it determines the number of times the code inside the loop is obeyed.

When the micro encounters the FOR for the first time it knows that there is going to be a loop and looks for the loop control variable. In this case it's the aptly named variable *loop*. The rest of the line tells it that *loop* will go from 1 TO 5.

Obediently, the computer gives *loop* the starting value of 1 and then goes on to the next line. It carries on obeying line after line until it comes to the NEXT that marks the end of the lines inside the loop.

In Program III there is only one line but the principle is the same. All the lines inside the FOR ... NEXT, known as the body of the loop, are repeated one after the other until the NEXT is reached. Now the loop control variable has its value automatically increased by 1. So *loop* becomes 2.

Here the micro has to make a decision. It knows that it has to loop round for a certain number of times and only then go on to the line after the NEXT. Accordingly it looks at the value of the loop control variable and sees if it is greater than the final value specified after the TO.

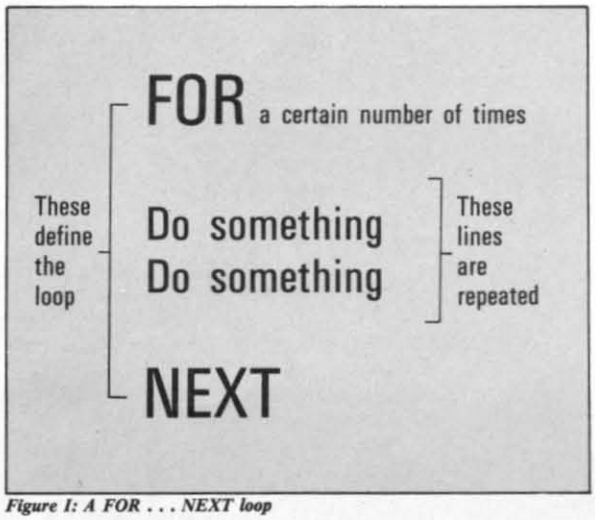

Figure I: A FOR . . . NEXT loop

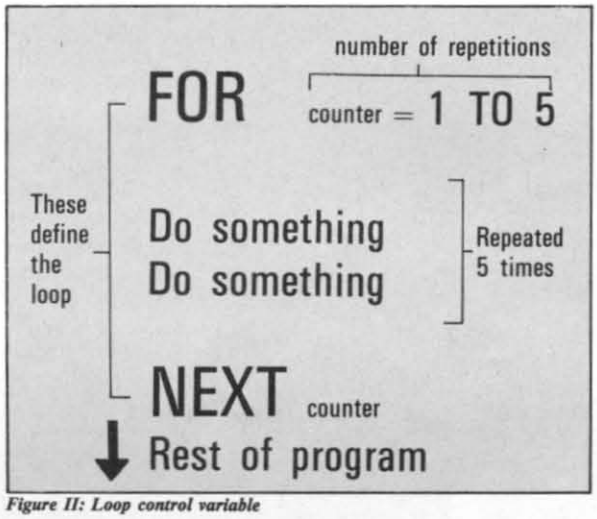

Figure II: Loop control variable

If it isn't the program goes back to the start of the loop beginning the whole process of obeying the lines in the body of the loop, then incrementing and testing the loop variable over again.

If the loop control variable has exceeded the limit the program drops out of the loop and goes on to the line after the NEXT. Figure II gives a general description of what's happening.

In Program III's case the micro looks at the value of *loop* and compares it with 5. As 2 is not greater than 5 the loop cycles again. When the NEXT is reached 1 is again added to *loop* to make it 3. Again it's compared with 5 and the program goes back to repeat the loop again.

As this goes on *loop* takes all the values from 1 to 6. Only when the loop is 6 is it greater than the limiting value specified after the TO. Now the micro drops out of the loop and looks for the next line. As there isn't one the program stops.

Program IV shows another FOR . . . NEXT loop in action. Again it's only printing messages but these messages should help you gain some insight into the workings of a FOR . . . NEXT loop.

From line 20 you should see that the loop will cycle three times. The loop control variable is *cycle* which is allowed the values 1, 2 and 3 while the loop is working. As soon as it gets to 4 the loop stops and the program goes on to the last three lines.

The body of the loop consists of three

```
10 REM Program IV
20 FOR cycle= 1 TO 3
30 PRINT "This is the body of the
loop"
40 PRINT "Cycle ";cycle
50 PRINT
60 NEXT cycle
70 PRINT "The loop has finished"
80 PRINT
90 PRINT "Cycle now has the value
";cycle
```

Program IV

lines, one of which is just used to create a blank line for a neater display. Line 30 just tells you that the micro is working its way through the body of the loop. Line 40 shows which cycle of the loop it is by using the current value of the loop control variable *cycle*.

Notice that the final value of *cycle*, displayed by the lines after the loop finishes, is 4. It's easy to see from the FOR . . . NEXT that the loop will repeat three times. Don't let this fool you into thinking that the loop control variable will be 3 after the loop finishes.

It isn't, it's 4 as the program shows. The loop control variable is always one greater than the final value shown after the TO.

In this case it's a fairly academic point but in longer programs you may be using *cycle* at some point and if you think that it's 3 when it's really 4 you've got problems.

Program V is hardly likely to go down as one of the programs of all time but it is worth looking at. Honest.

By now you'll see immediately that the loop will cycle five times. The body of the loop has four lines, the most interesting one being the INPUT of line 40. This takes a number from the keyboard and place it in the variable *number*. Line 60 just tells you what you entered.

Unexciting though the program is it

```
10 REM Program V
20 FOR loop=1 TO 5
30 PRINT " Give me a number"
40 INPUT number
50 PRINT
60 PRINT "You gave me ";number
```

Program V

does show the great flexibility of FOR . . . NEXT loops. Try changing line 20 to:

```
20 FOR loop=1 TO 10
```

and you'll have the loop cycling 10 times or:

```
20 FOR loop=1 TO 100
```

which will have the program asking you for 100 numbers. As you can see, small changes in FOR . . . NEXT loops have great effects on programs.

Also, you don't have to decide the number of times the loop cycles until the

From Page 47

program is actually run. Try adding the following lines and you'll see what I mean.

```
14 PRINT "How many times do you want
the loop to cycle?"
16 INPUT finish
20 FOR loop=1 TO finish
```

Here the loop will repeat *finish* times.

A last point to note about Program V is the NEXT of line 70. See how forlorn it looks? Previously all our NEXTs have had the name of the loop control variable beside them. As you can see, this isn't strictly necessary – the BBC Micro can keep track of things without it.

However while the micro knows what it's doing, it's all too easy for the programmer to get lost in a tangle of FORs and unlabelled NEXTs. It's good practice to annotate the NEXT with the appropriate loop control variable.

Having rambled on about Program V and used it to expand our knowledge of FOR ... NEXT loops, we can now admit it's pretty stupid. After all, we use it to store a number in *number* and then, next time round the loop, *number* is used to store another number. The first number is lost. Program VI, a close relative of Program V, is far more sensible.

Again the loop cycles five times, but now each *number* is safely tucked away

```
10 REM Program VI
20 total=0
30 FOR loop=1 TO 5
40 PRINT " Give me a number"
50 INPUT number
60 total=total+number
70 PRINT
80 NEXT loop
90 PRINT "The total is ";total
```

Program VI

inside *total* which is used to keep a running total of the values given to the program.

Try varying the program, making it add 10 or 20 numbers with the lines:

```
30 FOR loop=1 TO 10
```

and:

```
30 FOR loop=1 to 20
```

If you cast your mind back to Program IV you'll remember that we used the loop control variable *cycle* inside the loop. There it was just used to help number the loop. However the loop variable can be used inside the loop to better effect, as Program VII shows.

Here, as before, the variable *total* is set to 0, ready to keep a running total.

```
10 REM Program VII
20 total=0
30 FOR loop=1 TO 5
40 total=total+loop
50 NEXT loop
60 PRINT "The total is ";total
```

Program VII

However, whereas before *total* held the sum of the numbers input to the program from the keyboard, this time it holds the sum of the values taken by the loop control variable.

Line 40 does this job. The first time round the loop *total* is 0 while *loop* is 1. Line 40 adds *loop* to *total* with the result *total* now contains 1. The second time round the loop *loop* is 2. This is added to *total* which now becomes 3. As the loop proceeds so each successive value of *loop* is tucked away inside *total*. The result is that *total* holds the sum of the whole numbers from 1 to 5.

Again, notice how flexible the structure is. It's easy to add any number of numbers.

```
30 FOR loop=1 TO 100
```

adds the first hundred numbers while:

```
30 FOR loop=1 TO 1000
```

adds the first thousand. And:

```
24 PRINT "Add up to?"
26 INPUT final
30 FOR loop = 1 TO final
```

is even more flexible.

That's where we'll leave it for this time. We've come a long way in just one article. Previously we were limited to programs that executed one line after another in relentless line-order number. Now we've learnt how to interrupt this linear flow of control (as it's known in posh circles) and send the program back on itself to do a job over and over again until we're satisfied.

While it may not be immediately obvious, our FOR ... NEXT loops increase the power of our programs immensely. Try playing around with them until you understand them thoroughly. This will pass the time until next month when we will take further STEPs in our exploration of loops.

PROBLEM

I BOUGHT a Solidisk Eprom Programmer which successfully read a spare ROM when I tried it. I have not used the device again until this week, when I found that it would no longer do so.

I have tried it with another computer and it worked satisfactorily so it seems that my computer is at fault. I have studied the results of an unsuccessful read, and find that the two lower bits for every character are consistently 1s, so that A and B are both converted into C, (and) to +, Acorn to Ccoso, and so on.

This seems to point to pins 10 and 11 of chip 69, and I note that my Solidisk base unit has wires soldered to these pins (and to No. 12).

I hesitate to inspect the underside of the base unit because I have had many difficulties with the Solidisk over the last year, and it is working well at the moment. Can you suggest anything I might try before buying a new 6522 chip? – F.S. Dewhirst, Keighley.

SOLVED

I am not familiar with the Solidisk Eprom Programmer, but the fault you describe indicates that the two lower bits are not being driven to zero. If the unit plugs into the user port to get the data information (as opposed to the address information) then it sounds like the 6522 or connector that is faulty.

I don't think there is anything wrong with your base unit as the rest of the system works. Have you tried removing the 6522 chip to make sure that no legs are bent underneath and so not making contact?

This could be the problem since a circuit that does not make contact will act like it is a logic 1.

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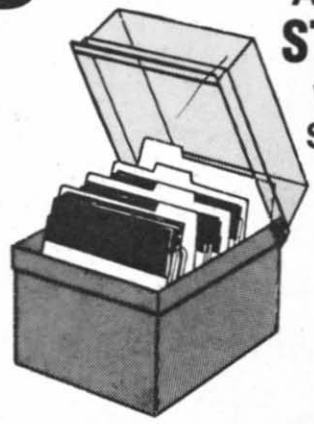

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Exploding squashed characters

Part three of ROBIN NIXON's series on designing your own customised characters

IN my last two articles we covered ways of exploding the BBC Micro's character set to print our own customised characters on an Epson compatible printer.

Well this month we're going to take a look at how to explode squashed characters!

Have you ever found that although Mode 2 is ideal for multi coloured graphics, the text is far too big to use easily? Using this month's utility you will be able to have up to 40 characters a row in Mode 2.

Characters are made up of an 8×8 grid, as shown in Figure I. However with a little ingenuity it is possible to design a complete character set using only a 4 × 8 grid. Figure II shows the idea.

Program I sets up 4×8 definitions for the numerical, upper case and lower case fonts. Simply type it in and run it. If you have made any typing errors while entering the data lines you will be able to fix them quite quickly using the character definer in the March issue of *The Micro User*.

As Program I saves the data while it runs, be sure you have a blank tape or a disc with enough room on it to hand.

Having saved the data – and Program I – type in Program II. This is the program which handles the new character set. I suggest you save it before you run it as any typing mistakes could produce some very unpredictable effects.

The program works by making the operating system think that there are 40 characters a line and that each character is only half as wide as it actually is.

This is achieved by altering location &34F. This byte is used by the BBC Micro to tell it how many bytes make up a character. In Mode 2 this is 32. So, if we replace this with the new value of 16 the micro will assume that the characters are only half as wide as they really are.

However the computer still thinks there are only 20 characters a line, even though they are half the size. The reason it thinks this is because location &30A, which contains the number of characters per line −1, is set to 19. So all we need do to overcome this is to set the value of location &30A to 39.

Then, to ensure that the print width is correct, we also set WIDTH to its

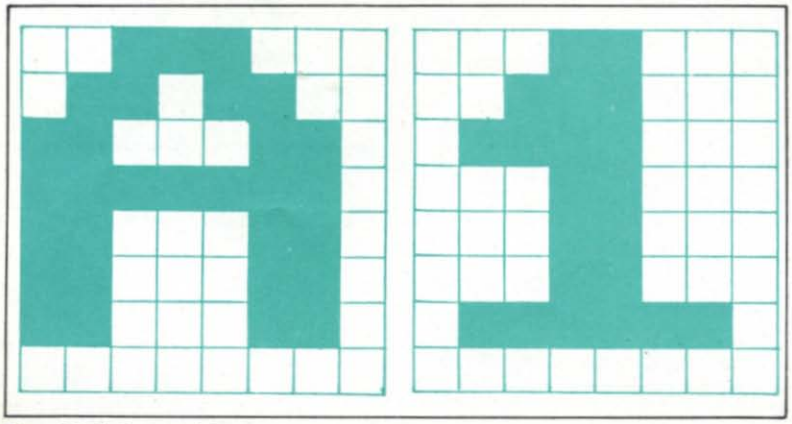


Figure I: 8×8 character definitions

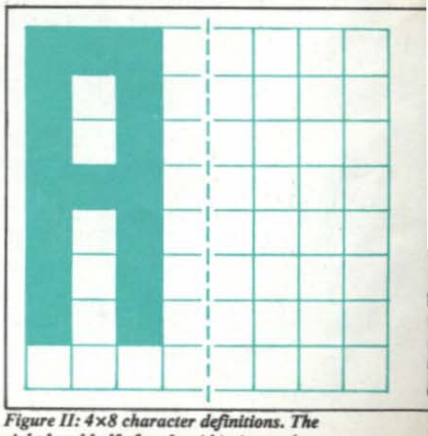
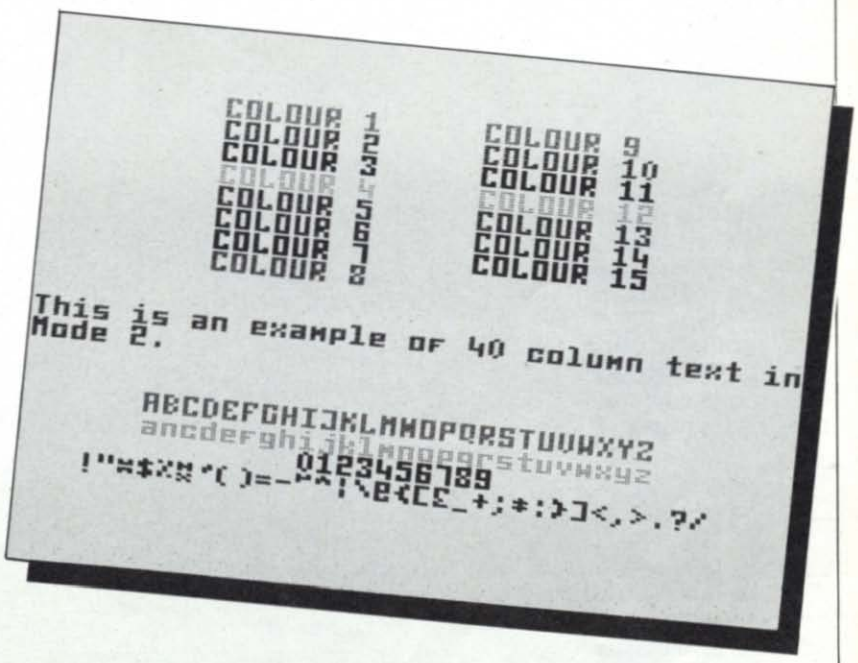


Figure II: 4×8 character definitions. The right hand half of each grid is ignored



default value of −1.

And finally, on a purely aesthetic note, we do a *FX 154,213 to set the cursor to half its usual Mode 2 width.

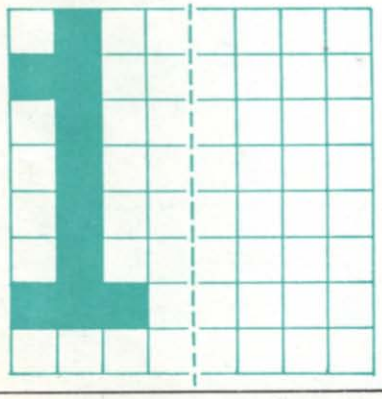
If you wish to use this utility in Modes 4, 5 or 6 rather than Mode 2 you must replace lines 190, 280 and 300 with the following:

```
190 MODE n:REM Where n=4, 5 or 6
280 ?&34F=8
300 *FX154,133
```

Line 280 sets the number of bytes per character to 8 as these are less memory consuming modes. And line 300 sets the correct cursor width.

Although this program will work in Modes 4 and 6 you will still only get 40 characters a line, but they will be of the squashed character set and might be useful for title pages and so on. The program will not, however, work in Modes 0, 1, 3 or 7.

To all intents and purposes running Program II will now cause all Mode 2 screens to resemble Mode 1. VDU 31,x,y or PRINT TAB(x,y) will work in the same way as with Mode 1 but, of course, you'll have the advantage of the full 16 colours.



Program I

```
100 REM ***************************
110 REM *                         *
120 REM * SQUASHED CHARACTER DATA *
130 REM *                         *
140 REM *     By  Robin Nixon     *
150 REM *   (c)  The Micro User   *
160 REM *                         *
170 REM ***************************
180 REM
190 MODE7
200 *FX20
210 PROCread:*SAVE C.SMALL-N C00 D0
0
220 PROCread:*SAVE C.SMALL-U C00 D0
0
230 PROCread:*SAVE C.SMALL-L C00 D0
0
240 END
250 DATA 00000000
260 DATA 44444040
270 DATA AAA00000
280 DATA 0AE0EA00
290 DATA 4EC46E40
300 DATA A244BA00
310 DATA AEA0A4A0
320 DATA 26400000
330 DATA 48888840
340 DATA 4222224Ø
350 DATA 04E4E400
360 DATA 044E4400
370 DATA 00000440
380 DATA 00ØE0000
390 DATA 00000440
400 DATA 2244B000
410 DATA 4AAAAA40
420 DATA 4C4444E0
430 DATA EA2E8BE0
440 DATA EA242AE0
450 DATA 8BAAE220
460 DATA E8E22AE0
470 DATA EA8EAAE0
480 DATA E2222220
490 DATA EAA4AAE0
500 DATA EAAE2AE0
510 DATA 04400440
520 DATA 0440044Ø
530 DATA 02484200
540 DATA 00E0E000
550 DATA 08424800
560 DATA EA264040
570 DATA EAAE8AE0
580 DATA EAAEAAA0
590 DATA CAACAAC0
600 DATA EA888AE0
```

From Page 51

```
610 DATA CAAAAAC0
620 DATA EA8C8AE0
630 DATA EA8C8880
640 DATA EA8AAAE0
650 DATA AAAEAAA0
660 DATA E44444E0
670 DATA E2222AE0
680 DATA AACCAAA0
690 DATA 88888AE0
700 DATA AEEAAAA0
710 DATA AAEEEAA0
720 DATA EAAAAAE0
730 DATA EAAE8880
740 DATA EAAAAC20
750 DATA EAAECAA0
760 DATA EA8E2AE0
770 DATA E4444440
780 DATA AAAAAAE0
790 DATA AAAAAA40
800 DATA AAAAEEA0
810 DATA AA444AA0
820 DATA AAE4444 0
830 DATA EA248AE0
840 DATA E8888BE0
850 DATA 88442200
860 DATA E22222E0
870 DATA 4EA00000
880 DATA 00000000E
890 DATA EA8848E0
900 DATA 00E2EAE0
910 DATA 88EAAAE0
920 DATA 00EA8AE0
930 DATA 22EAAAE0
940 DATA 00EAEBE0
950 DATA 00E8C880
960 DATA 00EAAE2E
970 DATA 88EAAAA0
980 DATA 4 0C444E0
990 DATA 206222AE
1000 DATA 88AACAA0
1010 DATA C44444E0
1020 DATA 00AEEAA0
1030 DATA 00EAAAA0
1040 DATA 00EAAAE0
1050 DATA 00EAAE88
1060 DATA 00EAAE22
1070 DATA 00EA8880
1080 DATA 00E8E2E0
1090 DATA 44E44460
1100 DATA 00AAAAE0
1110 DATA 00AAA440
1120 DATA 00AAEEA0
1130 DATA 00AA4AA0
1140 DATA 00AAAE2E
1150 DATA 00E248E0
1160 DATA 264C4620
1170 DATA 44404440
1180 DATA 8C464C80
1190 DATA AE000000
1200 DATA 00000000
1210 DEFPROCread
1220 FOR X%=224 TO 255
1230 VDU 23,X%
1240 READ A$
1250 FOR Y%=1 TO 8
1260 Z%=EVAL("&"+MID$(A$,Y%,1)+"0")
1270 VDU Z%
1280 NEXT
1290 NEXT
1300 ENDPROC
```

Program II

```
100 REM ************************
110 REM *                      *
120 REM * SQUASHED CHARACTERS *
130 REM *                      *
140 REM *   By  Robin Nixon    *
150 REM * (c)  The Micro User *
160 REM *                      *
170 REM ************************
180 REM
190 MODE2
200 *LO. C.SMALL-N 900
210 *LO. C.SMALL-U A00
220 *LO. C.SMALL-L C00
230 ?&367=&70 :REM Fonts in RAM.
240 ?&368=&9  :REM Numerical.
250 ?&369=&A  :REM Upper case.
260 ?&36A=&C  :REM Lower case.
270 ?&30A=39  :REM Right of screen.
280 ?&34F=16  :REM Bytes per char.
290 WIDTH -1  :REM Reset width.
300 *FX154,213
310 *FX138,0,76
320 *FX138,0,46
330 *FX138,0,13
340 REM *FX154 controls the video
350 REM ULA. The 213 sets the
360 REM cursor to half its usual
370 REM Mode 2 width.
380 REM The *FX 138s insert "L."
390 REM into the keyboard buffer.
```

This listing is included in this month's cassette tape offer. See order form on Page 139.

PROBLEM

WOULD you please supply further information on the Body Building Course in the November 1985 *Micro User*. My interest is in Figure IX showing the optical switch connected to the user port.

Where can I obtain the slotted switch HOA 2001 (or similar)? What would be the shortest pulse the system could detect? Using a BBC B would it be possible to monitor the movement of two such motors with accuracy?

Finally, could you provide me with a machine code program to give the maximum speed possible? – C.E. Holmes, Ambergate.

SOLVED

The HOA 2001 is available in a Body Build Pack. These switches can operate at a frequency of 100kH. By using CB1 and CB2 you can get the computer to respond to two separate pulses.

The software problem is very similar to the track ball software interface described in Body Building for February 1985. The maximum speed at which it can operate will depend on precisely what you want to do between pulses.

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Continued →

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Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
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OSWORD &7F	Yes	Yes	Yes
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Games compatibility	Yes	Yes	Most
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- *Acorn's DFS Kit complete* **£47**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17** • *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these! Operates both in Single & Double Density modes.

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£46**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the BBC+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

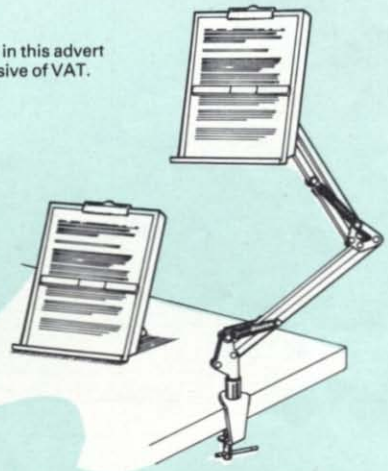
The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS (for BBC Plus) **£30**
(Price includes comprehensive manual)

COPY HOLDERS

All prices in this advert are exclusive of VAT.



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£17** *(carr. £3)*

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

When using a BBC Micro, most people find themselves preciously short of space. The Watford's BBC Micro Plinths form an ideal way of recovering some of this space; your BBC, disc drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. Some of our competitors offer disc drives built into plinths, but these aren't as sensible as you might think. With a Watford Plinth, your disc drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen and paper, reference manuals, etc. Follow the trend with Watford Plinth.

Drives Subject availability

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS 100 £75		CS 100 £116	
200K (360K)	CLS 200 £102	CLD200 £185	CS 200 £116	CD200 £199
400K (720K)	CLS 400 £104 / £105 CLS400S	CLD 400 £185	CS400 £123 / £124 CS 400S	CD400 £205
800K (1.44M)		CLD800 £194 / £195 CLD 800S		CD800 £218 / £219 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £6

Prefix **C** = *Cased Drive*
L = *Less PSU*
S = *Single*
D = *Double*

Suffix **S** = *40/80 Switchable*

e.g. CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

- *10 × 5¼" S/S D/D 40 Track Diskettes* **£11**
- *10 × 5¼" D/S D/D 40 Track Diskettes* **£13**
- *10 × 5¼" S/S D/D 80 Track Diskettes* **£19**
- *10 × 5¼" D/S D/D 80 Track Diskettes* **£20**

- *10 × 3½" S/S D/D 40/80 track Discs* **£25**
- *10 × 3½" D/D D/D 40/80 track Discs* **£35**

FREE Durabeam Pocket Torch with every two boxes of 3M Diskettes purchased from us this month.

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 × **M4** S-S D/D 40 Track Discs* **£10**
- *10 × **M5** D/S D/D 40 Track Discs* **£12**
- *10 × **M7** D/S D/D 80 Track Discs* **£17**

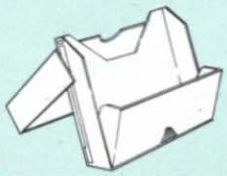
- **3"** *Double Sided Discs* **£4** *each*

(For special Bulk Offer, see page 2 of our advert)

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs **£9**
M85 – holds upto 95 discs **£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20** Twin (without PSU) **£3.85**
Single (with PSU) **£3.95** Twin (with PSU) **£3.90**

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP810/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! For the BBC Micro. This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

(Write for further details).

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and 'B'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

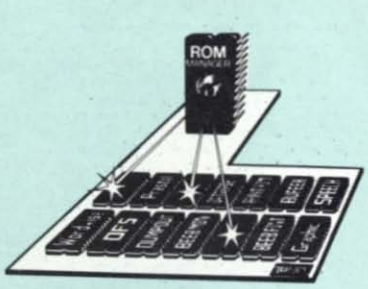
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £25 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

SPECIAL OFFER £18

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

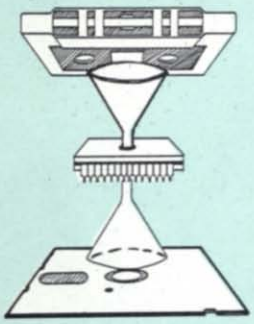
BEEB PRINTER ROM

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:
★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.
★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £25

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

This advanced and sophisticated utility ROM for the BBC Micro has the following features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

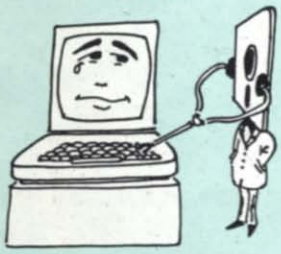
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

All prices exclusive of VAT

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£34**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.
(Write in for technical details.)

£24

DISASSEMBLER ROM

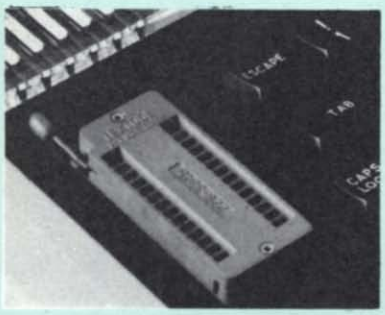
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

ONLY **£15** (carr £2)

16K Sideways RAM Modules

This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

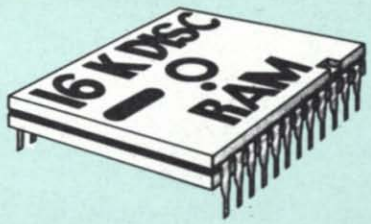
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices exclusive of VAT



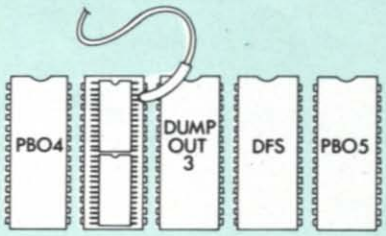
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30 (carr £2)

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

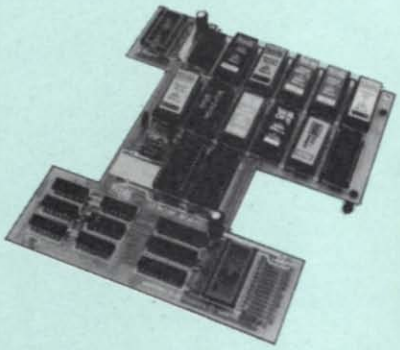
SOLID STATE 16K SIDEWAYS RAM



This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead terminating in a mini hook-on probe, to fit, (no soldering required) this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28** (carr 2)
Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

EXTERNAL Sideways ROM BOARD

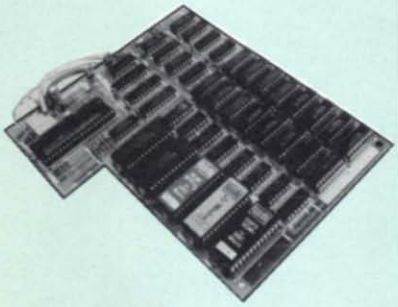
This extremely versatile 12 ROM Socket Board is supplied with power supply, boxed in an attractively finished BBC beige. A second board can be fitted at a later stage to give a total capability of 28 ROMs.

- No soldering required.
- Easy access to ROMs.
- Does not physically interfere with other internal add on boards.
- Built in power supply.
- Write protect for RAM.
- Allows upto 32K Static RAM and 24 ROM Sockets in varied combination.

Price: **£75** (carr **£3**)
(2nd Add-on Board **£30**)

Watford ROM/RAM CARD

A must for all serious users



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

ROM/RAM card with 32k dynamic RAM	**£45**
ROM/RAM card with 64k dynamic RAM	**£69**
ROM/RAM card with a massive 128k dynamic RAM (carriage on ROM/RAM Card £3)	**£109**

OPTIONAL EXTRAS:

16k plug-in Static RAM kit	**£7**
Battery backup	**£3**
Read and Write protect switches	**£2** *each*
Complete ROM/RAM board (all options installed)	**£125**

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *FREE 3 months subscription to Micronet and free registration to MicroLink to start you up.*

- *BT Approval applied for.*

Price: **£89** (carr £3)

PROHIBITED from direct or indirect connection to any telecommunication system run by British Telecommunications. Action may be taken against anyone attempting this operation.

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£115

(carr £3)

(Price includes: Nightingale Modem, Commstar ROM pack, Cables & Comprehensive manual)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

ISLAND LOGIC MUSIC SYSTEM only: £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

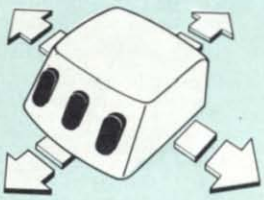
£42 (carr. £4)

GLENTOP's 3D GRAPHICS

Development System **£22**

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £65 (carr £1.50)

AMX DESK Package	**£20.00**
AMX UTILITY Package	**£12.00**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

Versatile **BEEB SPEECH SYNTHESISER** Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£51
CARETAKER Basic Utility	£27
Graphics ROM	£25
Disc Doctor ROM	£25
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£26

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£28**

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£40

INTER-CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £28

All Prices Exclusive of VAT

GRAPH PAD

With this popular Mk II British Micro's Graph Pad, you can add new dimensions to your computer enjoyment. It helps you to create your own applications programs by the simple use of the Graphpad. Ideal for educational use. Supplied complete with cables, Manual and Software Cassette.

Special Offer £51 (carr £3)

32K

SHADOW RAM-Printer Buffer

Expansion Board

A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only a 12K printer buffer can be used in Wordwise or Wordwise Plus due to the way in which they are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £75 (carr £2)

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

VIEW

VIEW WORDPROCESSOR 2.1 ..... **£39**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£38

VIEWSHEET (Acornsoft)	**£39**
VIEWSTORE	**£39**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

OMNIREADER

OCR at a price you can now afford

The manually operated omnireader is preprogrammed to read 4 common type faces – including: KAGA Courier 10, Courier 12, Letter gothic & Prestige Elite. It reads a line of text in about 3 seconds & is ideal for inputting already typed material into wordprocessor packages, such as View or WW, Databases or Spreadsheets. Comes complete with power supply, instruction manual, longrule & Dustcover. Also available on disc for the BBC is a utility program which merges input from the service port with the keyboard thus allowing full editing control whilst using the omnireader. Also included is a Basic program which displays the pixel map image obtained from the omnireader – ideal for doing your own OCR.

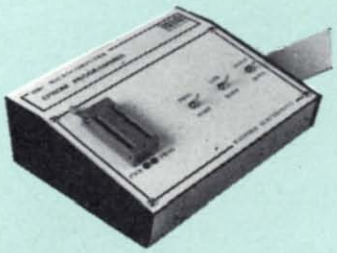
(As seen on the TV programme Micro LIVE)

Price: **£175**

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Development System	£7.50
68000 Assembly Lang. Programming	£19.95
A Young persons Guide to BBC Basic	£5.95
Advanced Disc User Guide	£14.95
Advanced BASIC ROM User Guide	£9.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Advanced Programming Techniques for the BBC Micro	£8.95
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£7.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic ROM User Guide	£11.95
Basic User Guide for BBC Micro	£10.00
BBC B+ User Guide	£14.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Machine Code Portfolio	£7.95
BBC Micro add on guide	£7.95
BBC Micro Advanced Reference Guide	£10.95
BBC Micro Advanced Programming	£9.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
BBC User Guide	£10.00
BBC Wargaming	£8.95
BCPL User Guide	£14
Business Applications on BBC	£7.95
Complete FORTH	£6.95
CP/M - 86 User's Guide	£19.95
CP/M Bible	£16.00
CP/M Handbook with MPM	£9.95
CP/M Plus Handbook	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Discovering BBC Micro Machine Code	£6.95
Disc System for the BBC Micro	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
FORTH on the BBC Micro	£7.50
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Graphics for Children	£6.95
Graphs & Charts on BBC Micro	£7.50
Guide to BBC ROM	£9.95
Hackers Handbook	£4.95
Hackers Handbook - New	£6.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing & Robotics on BBC	£7.50
Into View	£4.50
Introduction to COMAL	£9.50
Introduction to LOGO	£6.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£16.50
ISO -PASCAL Reference Manual	£9.95
Let your BBC teach u to program	£5.45
LISP	£11.95
LISP, A Beginners Guide to	£10.95
Logo Programming	£9.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£17.95
Micronet Handbook	£6.95
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Sencing & Control Projects for BBC	£5.95
S-PASCAL on BBC Micro	£7.50
Structured Prog. with BBC BASIC	£6.50
Termulator Manual	£4.95
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Turtle Graphics on BBC Micro	£7.50
Using Floppy Discs with BBC Micro	£5.95
View Guide	£4.50
Viewsheet User Guide	£10
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45
Wordwise Plus Guide	£9.95
Z8000 Assembly Language Programming	£18

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69 (£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£110 (Carr. £3)

(Price includes: Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of the AMX Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within AMX Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£129.00** (carr. £3)

Continued →

DATAGEM

Now compatible with Watford DFS's

Long hailed as the most comprehensive and powerful database for the BBC, and now becoming a legend in its own right, DataGem has been significantly reduced in price now that development costs have been recovered by Gemini. Whether you have a single 40 track drive or a Winchester hard disk, this system will make use of ALL your disk space, treating up to 4 drive surfaces as ONE CONTINUOUS FILE. Much has been made and exploited of DataGem's superb selective searching capability, and together with its unmatched mathematical powers, the system provides a really professional database for use in the home, office or school that will harness the full power and potential of the BBC micro.

AMATEURS & PROFESSIONALS

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- Urgent notice board.
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For fuller description on any of the software titles on this page, please refer to Gemini's own advert in this publication.

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For full details please read Gemini Marketing's advert in this magazine.

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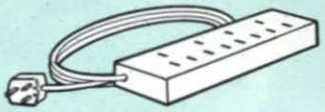

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Philips 7502 Green Screen	**84.95** (s)
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All monitors come with a BBC cable

ARTIST

The new colour graphics package from Pear Tree using the ultimate mouse – Megamouse. This powerful art package allows all the normal facilities as well as sprites of any size, pattern editing and colour exclusion. The package comes complete with a manual, rom software, system discs and an Epson screen dump. The Artist package and the Megamouse can be bought separately or as a complete package.

Artist	**53.00** (b)
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See us on Prestel – Page 60043754

Q & A for the Gods

Program: Powerplay: The Game of the Gods
Price: £14.95 (disc only)
Supplier: Arcana Software Design, Avondale Workshops, Woodland Way, Bristol BS15 1QH. Tel: 0272 48401

BEFORE even playing Powerplay, the Game of the Gods, I was impressed with this software. The disc is packed in a large colourfully illustrated video style plastic case, complete with an equally well produced instruction manual.

The game is only available on disc, which is supplied in a rather unusual format, double sided with a 40 track version on one side and an 80 track version on the other.

The game is based on the role playing type of board game where each player controls a number of characters trying to build up their qualities of wisdom and strength until they eventually develop enough powers to overthrow their opponents.

Two to four players may take part and each begins with four warriors. There can, therefore, be a maximum of 16 characters on the board at the start of play.

The idea is quite simple. Each player takes a turn, and selects which of his warriors he wishes to use. The player must then answer a question which is flashed on the screen for a short time. A correct answer increases the character's wisdom points, and when 25 are achieved the warrior is given the opportunity to mutate into a character of higher strength.

As the pieces increase in strength and wisdom they attempt to move around the board to squares occupied by opposing players, and throw down a challenge.

When a challenge is issued the two players concerned are given a chance to answer one question. The first player to answer correctly wins the challenge and defeats the opponent.

The losing warrior is then downgraded to a lower strength level, or if already at the lowest level, is removed from the board.

Play continues until only one player has any remaining warriors.

The disc contains several data files full of questions on a variety of subjects. For each question four possible answers are displayed from which the player has to select the correct one.

There are some 2,000 different questions on the disc, which make the possibility of the same questions recurring too often quite remote. In fact during the review period I don't think I saw a repeat of any question.

There is also a useful facility built into the software which allows new datafiles of questions and answers to be created. These files need to be first produced with a word processor and they are then compiled by the program into a format suitable for the game.

I enjoyed this game, it is highly original and entertaining. The graphics are truely excellent, with the board and

colourful scenario displayed in 3D fashion with cleverly animated characters.

Speech is also generated, but this is only available if an Acorn speech system is fitted.

The question and answer files are interesting and varied, and the ability to create new question files adds to the long term usability of the game.

Geoff Turner

Sound	8
Graphics	10
Playability	8
Value for Money	8
Overall	8

Bugged spinner

Program: Gyroscope
Price: £8.95
Supplier: Melbourne House, 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DB. Tel: 01-943 3911

THE scenario in this arcade style game is of a gyroscope, spinning and falling down hills. You control it using the usual four keys for left, right, up and down. Your aim is to steer it along narrow causeways and into a little hole.

This may sound easy, but most of the slopes are on a diagonal course with precipitous hair-pin bends, which require skillful handling of the control keys.

Magnets are strewn about the place to make your task more complex. These turn your gyroscope into a whirling dervish, flying hither and thither like a ball on a pin table.

As if this weren't enough, there are also aliens, hell-bent on knocking the gyroscope over. They take the form of arm-waving ghosts, sidewinder snakes, rival gyroscopes and fried eggs.

If the gyroscope falls off a path, or is knocked over, you lose one of your seven lives.

To complete the game you must master four routes, each consisting of three screens which scroll vertically. The instructions promise a surprise when the game is completed, but I've only mastered three routes so far.

The graphics are of a very good quality, with pleasing use of colour, except for an unnecessary flashing at the start and a garish hiscore table.

Sadly, a couple of 'problems' spoil what could be a very good game. Sometimes, a magnet captures the gyroscope and the game seems to freeze, whilst emitting an irritating noise. It is also possible for an alien to be at the spot where the gyroscope re-starts after falling over, which means all seven lives can be lost. Such 'bugs' ought not to appear in software priced at £8.95.

Roger Frost

Sound	9
Graphics	4
Playability	6
Value for Money	4
Overall	5

The karate champion

Program: Way of the Exploding Fist
Price: £9.95
Supplier: Melbourne House, 60 High Street, Hampton Wick, Kingston-upon-Thames, Surrey KT1 4DB. Tel: 01-943 3911

KARATE may be old news to the box office, but with all the new games coming on to the computer market one has to be the winner – The Way of the Exploding Fist.

The scenario, two men locked in combat presided over by a Buddha and a monk, is simple, but it demands great skill and concentration to reach the goal of 10th Dan by fighting and defeating your opponents.

One or two player modes are available, each with a very different challenge to offer. In a one player game it is best to defeat the computer with the utmost speed and precision within the time of 30 seconds. For each two fights won you progress one Dan.

The keys are well placed at different ends of the keyboard and combinations of keyboard and joystick are available, though there are 18 moves and 10 keys to cope with.

The variety of moves seem endless, with kicks, jabs, blocks, punches and somersaults. This game is definitely the best of the karate simulations.

The backdrop on the proceedings gives one a feeling that the programmer put as much effort into it as with the detail on the two characters.

I was so enthralled by the game that I couldn't bare to switch off and leave it to the next day – the graphics, music and character animation are excellent.

It is so visually absorbing that I feel that it is almost beyond criticism, but for the fact that it has no shadows on the B Plus or Electron.

Giles Lane

Sound	6
Graphics	9
Playability	9
Value for Money	9
Overall	8

Lure of steam

Program: Southern Belle
Price: £7.95
Supplier: Hewson, 56B Milton Trading Estate, Milton, Abingdon OX14 4RX. Tel: 0235 832939

WHEN steam locomotives were popular many schoolboys had ambitions of becoming engine drivers. Even adults who were not steam engine fanatics often dreamed of taking control of a real train.

Now, with Southern Belle, you can re-live those days and try your hand at being a steam engine driver in the comfort of your home.

The ultimate aim is to travel from London to Brighton taking your place on the footplate of this King Arthur class locomotive. A menu has seven options, including a demonstration run, various practise options and a problem run.

A demonstration run automatically engages after a minute and you would be well advised to watch this. It gives you an idea of the features and terrain that you are going to meet.

A leaflet explaining the principles of steam locomotion is included in the package.

The demonstration over, you should spend some time on the training run.

When you have mastered the training, and it will take a while, you can move on to more challenging schedules such as the record breaking run, set on July 26, 1903 at 48 minutes 41 seconds.

You must keep to speed regulations and be careful not to derail when going round bends – a regular occurrence in my attempts.

The screen is built round a central window containing a 3D graphic representation of the track, surrounding countryside, and the footplate.

The information display includes a digital clock, water, coal, and speed indicators, and a typical railside signal. There is also an indication as to your current position along the line.

The passing countryside and stations are depicted using 3D wire graphics. Unfortunately they aren't very smooth, jumping in big blocks as the train moves forwards, particularly when travelling at speed.

Sound is kept to a minimum and consists mainly of suitable hissing noises and the inevitable whistle.

There are two main things going for this program. The first is its originality. As an attempt to provide something new it succeeds and I enjoyed reviewing it, if only for that.

The second is that a special Electron copy is recorded on

side two of the tape. This ought to be adopted by other software houses more often. It must cut down production costs the benefits of which in time may pass on to the consumer.

This game should certainly be a hit with railway enthusiasts and simulator fans, but whether it will catch on with arcade addicts only time will tell.

David Andrews

Sound	8
Graphics	6
Playability	6
Value for Money	6
Overall	7

Even Steve suffers

Program: Steve Davis Snooker
Price: £8.95
Supplier: CDS, Silver House, Silver Street, Doncaster DN1 1HL. Tel: 0302 21134

JUST in case you can't get your quota of snooker on television you could always try your hand at the computerised version. It's less embarassing when you miss!

Of the two games, snooker and pool, I have always found that pool can be computerised very well but snooker is usually a bit of a disappointment. In scaling the big table down to TV size the balls become too small to allow the accurate judgement of angles. Steve Davis Snooker is no exception.

One point in the game's favour is the fact that it will provide you with an opponent, in the shape of Mr Davis himself.

This is the first snooker game I have played which does this.

Playing a shot is also carried out in several stages. Firstly you must position the cursor next to your target ball, in this case a red.

Unfortunately the cursor will only move vertically or horizontally, pressing both the up and left keys cannot coax it into

moving diagonally.

Spin is the next factor which must be specified, this can be top, back, left, or right. You cannot apply a combination of two of these so the more fancy positional play is ruled out.

Finally, having specified the power of the shot, you can press the spacebar and watch the balls ricochet around the table. The speed of the balls' movement is governed by how many other balls are moving at the same time.

The graphics are nothing special, but I have yet to see a good snooker game on the BBC. Its main redeeming feature is the computerised opponent option.

Jon Revis

Sound	4
Graphics	6
Playability	6
Value for Money	6
Overall	6

A girl's best friend

Program: Diamond Mine II
Price: £2.50
Supplier: Blue Ribbon, Silver House, Silver Street, Doncaster. Tel: 0302 21134

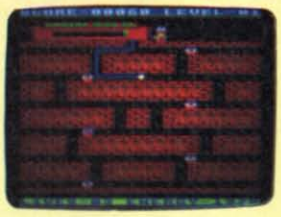
HAVE you ever wished you could own a diamond mine? Well, now you can if you buy Blue Ribbon's latest release.

In the game you must obviously collect all the diamonds scattered about the mine shafts. You have an assistant to help you – a robot called Diamo who keeps the winch motor running until you have run out of energy or collected all the diamonds on that screen.

At the beginning of every game Diamo casually walks across the screen wearing a cute pair of red shots and an innocent look on his face and tells you to get ready to play the game.

You collect the diamonds by using a vacuum pipe that will suck up any diamond it is directed at. Roaming the mine shafts all the time are the evil 'eyes'. They will kill you if they touch your pipe, but you can suck them up temporarily.

You must be careful not to go back on yourself when trying to kill the eyes because you will lose a life, however, it is possible to



retract the pipe by pressing Return.

When you do this everything on the screen stops except for the movement of your pipe, which makes the game even easier than it already is.

If you run out of energy before you have completed the screen then poor old Diamo's head explodes in a puff of smoke.

There are 10 levels to negotiate and you have four lives to do them in. After level 10 the cycle starts again, but this time the screens will be invisible.

Diamond Mine II is very much an average game that is fairly easy to master. At best it may keep the kids quiet for a few days.

Simon Rubins

Sound	4
Graphics	5
Playability	7
Value for Money	8
Overall	6

Hot line to learning

Program: Hotline Quiz
Price: £14.25 (disc only)
Supplier: Chalksoft, PO Box 49, Spalding, Lincs. PE11 1NZ. Tel: 0775 69518

IN Hotline Quiz you must use your knowledge to save the world.

The hotline telephone link between the super powers must be kept open to maintain peace, but the line is broken and the world is on the brink of disaster.

You must repair 25 sections of the hotline between the White House and the Kremlin by answering up to 20 quiz questions.

The correct answer is chosen from four possibilities presented in a multiple choice format. Incorrect responses do not automatically mean failure, as some answers carry hidden bonuses.

Nine sets of 25 questions are provided on disc, graded from 1 star (easy) to 6 star (genius) and Chalksoft claim there is something for all ages.

The start menu offers three options – play the current set of questions, load a new set or access the special menu which offers many useful facilities.

You can specify the number of questions in each round (from 5 to 20), add new questions to the set in memory, create new sets, overwrite existing questions and save them.

Colourful and attractive animated graphics are used effectively in the Title and Reward sections. Questions are shuffled for each quiz and answer entry is single key.

Correct responses are rewarded with a "thumbs up" logo.

Unfortunately the program exhibits a serious weakness when new sets of questions are created. The software can only cope with maximum string lengths of 203 characters for questions and 35 for answers, and the input routines are not error-trapped.

You can enter null strings or strings of 255 characters. Both cause fatal crashes when you try to save and use the quiz, or the screen display is ruined as long answer strings overwrite each other.

My initial impression was that the software was simply an aid to learning facts but on closer examination I realised that it has much more to offer.

It does help children to learn basic facts about any subject area, but it also develops useful skills when they devise and collate their own quiz because their questions must satisfy specific criteria if they are to be acceptable.

This program will prove very useful at home and in the classroom once it has been properly error-trapped and made more user-friendly.

Jim McHugh

Sound	5
Graphics	8
Educational Value	5
Value for Money	4
Overall	6

Musical micros

Program: Micro Maestro Keyboards
Price: £14.99 (two cassettes)
Supplier: Mupados, Unit 11, Llambed Industrial Estate, Tregaron Road, Lampeter, Dyfed SA48 8LT. Tel: 0570 422877

"MICRO-Maestro means the end of solitary music practice", proclaims Mupados's publicity blurb. Well, I wouldn't go that far, but it does offer young musicians a way of practising while also making use of their micros.

The aim of the program is to get children to play tunes to accompaniments recorded on an audio cassette supplied with the package.

For years musicians have been able to buy pre-recorded backing tapes for practising solos in concert style without having to hire a symphony orchestra, but as far as I know only Mupados have combined this idea with computer-aided learning.

The melody lines of six tunes, including the themes from Chariots of Fire and Superman, are displayed on screen in standard notation a few bars at a time, to be practised with or without the notes being sounded by the micro's internal speaker.

Sections can be repeated, the tempo can be changed to suit different levels of skill, and a bouncing ball can be made to skip lightly across the score indicating the note to be played.

There is also a visual pulse counter to show the relationship between note groupings and the regular beats of a bar.

All this is done competently, with good graphics and an effective method of providing continuity in reading the score.

The pack is supplied in separate configurations for concert pitch instruments, transposing instruments and keyboards. The concert pitch version gives a choice of treble, bass and alto clefs, and the transposing version can be used for instruments pitched in B flat, E flat and F. The keyboard version displays suggested fingerings as the notes are sounded.

Despite all these features, the package is rather limited in its potential, mostly because you're stuck with the six tunes supplied. If music teachers could enter their own melodies and record an accompaniment the program would stand a better chance in schools.

Furthermore, it has been designed to run on both the BBC Micro and the Electron, so only one sound channel is used. This means that in the keyboard version the player is confined to one right-hand line – not exactly what a keyboard was designed for.

The program comes on cassette only, and each pack costs £14.99. Given its limitations, this is a little high in my view, despite the original approach and the high quality of the backing tracks. **Gabriel Jacobs**

Sound	4
Graphics	8
Educational Value	7
Value for Money	7
Overall	7

Educating icons

Program: Wordplay
Price: £9.95
Supplier: BBC Soft, 35 Marylebone High Street, London W1M 4AA

WORDPLAY is an original and innovative idea, attempting to introduce the complex ideas of word processing to young children through the use of animated icons.

These animal icons, rejoicing in delightful names like Selina Seagull and Petronius Pelican, show the child in an amusing and educationally valid manner the various options available in a word processing program.

The icons are permanently displayed at the bottom of the screen below the text window which can display at any time nine of the 33 lines of text possible in the file.

However there are a couple of areas where I feel the program is less than user-friendly and where children may be easily confused.

My chief criticism is reserved for the left and right justification, made by Eve the Elephant and Boris Bear.

Boris tidies by pushing the left margin, but only from column two or greater, and leaves a ragged right result.

The elephant, however, then right justifies back to the first column by tugging, often leaving very large gaps in the text, large enough for words to be included from the line below.

I am not convinced that children will really appreciate how useful word processing can be from this program, although the excellent booklet will prove an effective tutor.

Phil Tayler

Sound	6
Graphics	8
Educational value	7
Value for Money	7
Overall	7

Four for the classroom

Program: Machine, Scales, Golfer, Bar Chart
Price: £19.50 (disc)
Supplier: Strawberry Fair, 15 Walker Road, Portsmouth PO2 8PQ. Tel: 0705 697867

THESE four programs are representative of much educational software in schools today. They are not at the glamorous end of the market but are there to do a job and, like many such programs, the quality can vary a great deal.

In Machine you input a number, the machine works on it, outputs it, and you work out what it did to the number. The program brings the concept to the micro admirably.

The machine can be set to work using numbers 1 to 10 or 10 to 20 and can use add, subtract, multiply or divide as required.

Adding and multiplying are fine and subtraction causes little misunderstanding as long as numbers higher than the one the machine is using are tested. Division, though, is best left until a reasonable degree of proficiency has been acquired.

Unless suitably large numbers are entered for the machine to operate upon the outputs and rejects can be quite confusing. On the whole, the program is well worth considering.

Scales is not quite up to the same standard. The program is "designed to improve the user's ability to estimate within the context of length".

A scale is displayed and the user asked to estimate the length of a line above and to the right of the scale. Unfortunately the scale can be marked to show, for example, two in ones, 100 in 20s or 1,000 in 200s. Too much for the user at that level to cope with.

Scores are shown as a red line shooting up a thermometer and as a percentage error. The ideas behind the program are sound but as always, and this is true for much educational software, it's not what you do but the way that you do it.

Bar Chart draws a bar chart to the user's specification. Information to plot and label the axes is entered followed by the data. The bars are then drawn as the data is entered.

If any alterations are needed they can be made easily, and again the result can be seen immediately. The chart, complete with a title, can be dumped to a printer with a suitable screen dump.

Though not a substitute for drawing it yourself, this is a clever little program. The version sent for review, however, had quite poor error trapping and did not cope well with the sorts of errors to be expected in most classrooms.

The programs are a very mixed set in terms of quality, but worth a look at by anyone wanting maths programs to cover some basic groundwork.

If they are bought as a set of four they represent reasonable value for money, but the decision is more difficult on an individual level. **Frank Jukes**

Sound	3
Graphics	4
Educational Value	6
Value for Money	7
Overall	6

A kick off the old block

Program: Karate Combat
Price: £9.95 (cassette), £11.95 (40/80 disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX. Tel: 0532 459453

MARTIAL arts games certainly seem to be popular at the moment, with Karate Combat from Superior Software adding to the available range on this theme.

The game follows the usual format, with the scene set against an oriental backdrop and the two players awaiting combat on the floor area. The referee sits on the sidelines, ready to issue commands and keep track of the scores.

The game provides three options – practise, single player and two players. Practise mode gives you the opportunity to knock spots off a stationary punchbag. In this mode it is possible to practise all the available moves – and there are quite a few – without the worry of being smashed to the ground by your opponent.

The single player option lets you play against a computer controlled opponent. To see your opponent jumping, rolling, punching and kicking with extraordinary speed and dexterity is enough to send you scurrying back to the practise mode.

The third option allows two players to compete against each other, which probably gives you more of a fair chance than playing against the computer.

There are 16 different opponents, and each victory gives you a crack at a new one. If you manage to beat the final opponent, known as The Master, you can enter a draw to win £100 and a trophy.

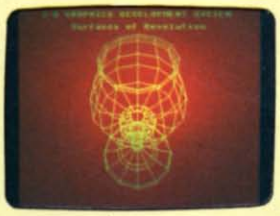
The game may be played with either keyboard or joysticks, but using the keyboard is quite tricky due to the number of keys used to cover all the available moves. Joysticks are a much easier option.

The graphics are colourful, smooth and flicker-free, but the screen area used is quite small. Sound effects and music are also provided, with the option to toggle these on or off.

I can't get very excited about these martial arts games, but nevertheless this version is as good as any I have seen, and certainly up to the usual high standard which we have come to expect from Superior.

Geoff Turner

Sound	7
Graphics	7
Playability	9
Value for Money	8
Overall	8



Animate in 3-D

Program: 3D Graphics Development System
Price: £25 (two discs + 95 page manual)
Suppliers: Glentop Publishers, Standfast House, Bath Place, Barnet EN5 1ED. Tel: 01-441 4130

MANY people have marvelled at the incredible spacecraft which helped to make Elite such a unique game.

With the aid of this package you too can create similar wire frame models. You can even incorporate them into your own Basic programs.

You must think in three dimensions and enter all of the appropriate MOVE and DRAW commands via the editor.

This may not be too difficult in the example used in the handbook, a square. But try and apply the same principles to an Elite-type spacecraft, as mentioned in their sales literature, and you have a long night ahead of you.

The wonderful flicker-free animation of your 3D masterpiece has to be carried out from one of your own Basic or machine code programs. There is no facility to animate your model from within the graphics development system.

They do provide all of the necessary routines as Basic procedures, and also the machine code core of the system. But you have to go outside of the system to use them.

The end results are very impressive, it's just a pity that the road to producing them is such a difficult one.

James Riddell

Sound	N/A
Graphics	9
Ease of use	3
Value for Money	5
Overall	5

Addresses immediate and absolute

MIKE BIBBY helps make sense of machine code – Part 4

BY now you should be fairly familiar with the idea that a machine code program is simply a series of bytes in memory, some of which are direct instructions to the processor – we call them opcodes – and some of which are data for a preceding opcode to work with.

The opcode itself tells the microprocessor how many of the following bytes, if any, are data.

It's an easy task to work out the memory location of the next opcode. A two byte internal memory space or register called the Program Counter keeps track of things by storing the address of the next opcode to be done.

Program I was our typical program. It simply loads the value &41 into another register, the A register or accumulator – only one byte long this time – then stores or copies that value into memory location &7C00. We then return from our routine with RTS.

Location	Mnemonics	Opcodes
2000	LDA #&41	A9 41
2002	STA &7C00	8D 00 7C
2005	RTS	60

Program I

Note that we load our accumulator with a constant, &41, which is similar to the Basic statement A=&41. The (hash) sign after the LDA is the way our mnemonic informs us that the number following it is to be loaded into the accumulator as a constant.

On the byte level LDA#&41 translates as A9 41. So how does the 6502 know that the number it's to load the accumulator with is in the byte following?

Well A9 isn't just the translation of LDA, it's the translation of LDA#, which means LoaD the Accumulator with the number immediately following this byte.

However we don't always have to load the accumulator in this immediate manner – we can load it with the contents of a specific memory location. For example, we could load it with the contents of &8009. This way there's a bit of uncertainty – we don't necessarily know what the contents of &8009 are. So though we know for certain where we're getting it from, we're not sure exactly what we're getting.

In mnemonics we'd write this:

LDA &8009

There is no hash sign because we're not loading the accumulator immediately with a constant. We want it to copy into itself the contents of the address specified. Here's how it translates into hex:

AD 09 80

We've got a different opcode now, &AD, reflecting the fact that we've got two bytes of data following this time. The two bytes of data are, of course, the address we want to load the accumulator from, in lo byte, hi byte form.

Program II shows this instruction in practice. I've stored it at &2000,Hexer's default address. I've assumed you're using Hexer, listed fully in last month's issue. If not make sure you're in Mode 7, and have not scrolled the screen if you want to follow my description of what happens when you CALL the program.

Locations	Mnemonics	Opcodes
2000	LDA &8009	AD 09 80
2003	STA &7C00	8D 00 7C
2006	RTS	60

Program II

Actually all that happens when you run it is that the letter B appears in the top left corner of the screen. Try it and see.

So how did I know there's &42 (Ascii for B) at &8009? Use Hexer to find out. Select the first option, display memory, with start address &8000 and press Return a couple of times. The memory locations &8009 on should be:

42 41 53 49 43

Now, translating from the Ascii, &42 is B, &41 is A, so it starts BA and ends with C (&43). Not a crossword solver? Well, these are the Ascii codes for BASIC. On the BBC Micro &8000 onwards is the address of the Basic ROM, a very clever machine code program that teaches your micro Basic.

Now a ROM is a sequence of memory locations whose contents are fixed. It has to be like this so your micro knows Basic when it's turned on. The contents of normal, alterable RAM memory disappear when the electricity goes. We say RAM is volatile and ROM non-volatile memory.

I know that the Basic ROM contains

From Page 71

the message BASIC at &8009 onwards – that's how I knew Program II would give us the B. Program III shows you how to get all the Basic message on to your screen. It's a bit long winded but don't worry, we'll soon learn better ways of doing it.

```
Location   Mnemonics    Opcodes
 2000      LDA &8009    AD 09 80
 2003      STA &7C00    8D 00 7C
 2006      LDA &800A    AD 0A 80
 2009      STA &7C01    8D 01 7C
 200C      LDA &800B    AD 0B 80
 200F      STA &7C02    8D 02 7C
 2012      LDA &800C    -- -- --
 2015      STA &7C03    -- -- --
 2018      LDA &800D    -- -- --
 201B      STA &7C04    -- -- --
 201E      RTS          --
```

Program III

As you can see, I haven't filled in all the bytes for you. This is to give you some practice doing it yourself. If you use the preceding bytes as a pattern you should have no problem. Don't forget the final RTS.

Just a reminder – in hexadecimal we count . . . 8, 9, A, B . . . and not . . . 8, 9, 10, 11 . . . This means that consecutive memory locations go, for instance, . . . &2008, &2009, &200A . . . and not . . . &2008, &2009, &2010 . . . In hex &2010 follows &200F.

We now know two types of LDA. Firstly there's LDA followed by a hash which means load the accumulator with the constant immediately following. We call this way of specifying the data *immediate addressing*. Its opcode is &A9.

The second LDA is where we follow the opcode (&AD) with the full, two byte address of the memory location we want our accumulator loading from. This way of specifying where we get our data from is known as *absolute addressing* since we give the address in absolute, two byte detail.

I think you can see that we've always used STA with absolute addressing, following the opcode we used (&8D) with two bytes to specify the memory location we want the accumulator copying into. There are other ways of addressing STA – that is, other ways of telling it where to STore the Accumulator. Take a look at program IV.

```
Location   Mnemonics    Opcodes
 2000      LDA #&41     A9 41
 2002      STA &70      85 70
 2004      RTS          60
```

Program IV

The first part is straightforward enough. We load the accumulator immediately with the number &41 and then store it in memory location &70 with STA &70. But have a look how it translates:

STA &70 85 70

There are two major points here: Firstly we've got a different opcode for STA. Secondly we've only specified the memory location with one byte, &70, whereas previously we've used two.

The reason is that the memory address we're copying the accumulator to is in page zero. That is, it lies in the range of memory from &0000 to &00FF. (See the panel on the opposite page if you want this clarifying.)

The 6502 lets us use a shorthand form of addressing when we're specifying memory in this range. If you like, since it knows it's dealing with page zero it already knows the high byte is &00, so it only needs the low byte. Hence, we need only one byte to determine the address.

But how does it know it's dealing with zero page memory? Because of the opcode – we use &85 to tell the 6502 that the following byte is the low byte of a zero-page location – it can assume the high byte to be &00.

Using special opcodes to allow us to specify zero page usage is known as *zero page addressing*. Not only does it save memory – we don't need to give a high byte – it's also faster.

This being so, zero page locations tend to be well used by people who write micro's operating systems and languages, leaving little for the poor 6502 programmer.

Acorn, however, have been most generous in this respect, reserving &70 to &8F specifically for our own use. You can play with locations in this range to your heart's content but, unless you deliberately want to crash your micro don't alter any other zero page locations.

Incidentally, if you insist on being slow and wasteful, you can still use STA with absolute addressing, as in Program V. The 6502 won't stop it working, but I'm sure it will regard you disdainfully.

```
Locations  Mnemonics    Opcodes
 2000      LDA #&42     A9 42
 2002      STA &0070    8D 70 00
 2005      RTS          60
```

Program V

You can load the accumulator (LDA) from zero page with zero page addressing as well. The opcode for a zero page LDA is &A5. Program VI is a rather pointless example of its use in copying the contents of &70 into &71, going via the A register.

```
Locations  Mnemonics    Opcodes
 2000      LDA #&43     A9 43
 2002      STA &70      85 70
 2004      LDA &70      A5 70
 2006      STA &71      85 71
 2008      RTS          60
```

Program VI

So far we've been writing letters on the screen by poking onto the Mode 7 screen. This may work, but only in Mode 7, and we're only sure of exactly where our text will appear if we haven't scrolled the screen since the last clear. And there are other problems with this approach. For instance, it won't work over the second processor.

Acorn quite rightly doesn't approve of this sort of thing and have got their own method of getting things onto the screen. In fact they provide their own subroutine, OSWRCH, to tackle it.

You can handle subroutines from machine code in the same way as from Basic. Just as you can GOSUB 4000 in Basic knowing that you'll RETURN safely to the next instruction once the subroutine's finished its task, so you can call subroutines from machine code. Of course, being machine code we don't use line numbers as GOSUB does – we specify an address. The address for OSWRCH is &FFEE.

To call this subroutine we JSR &FFEE. That is, we jump to the subroutine that starts at memory location &FFEE. The opcode for JSR is &20, and we give the address in lo byte, hi byte form, so JSR &FFEE translates as:

20 EE FF

Just as when you GOSUB to a subroutine the subroutine has to end in a RETURN, so the OSWRCH routine also ends in its own equivalent of

RETURN – you've guessed it, RTS. The OSWRCH routine has an RTS at the end of it, so when you JSR &FFEE you return to your own routine once OSWRCH is done.

Of course you'll still need your own terminating RTS at the end of your routine. Program VII uses OSWRCH to put an asterisk on the screen.

```
Locations  Mnemonics   Opcodes
 2000      LDA #&2A    A9 2A
 2002      JSR &FFEE   20 EE FF
 2005      RTS         60
```

Program VII

OSWRCH works very like Basic's VDU. If you VDU &2A you'll get an asterisk at the position of the cursor. In effect Program VII is the machine code equivalent.

```
Locations  Mnemonics   Opcodes
 2000      LDA #&7     A9 07
 2002      JSR &FFEE   20 EE FF
 2005      RTS         60
```

Program VIII

You're probably quite used to using VDU 7 to give you a beep. Program VIII is the machine code version.

If you read through your User Guide you'll see that there are all sorts of things you can do with VDU calls. For instance VDU 31, 20, 12, 42 puts an asterisk in the centre of the Mode 7 screen.

See if you can emulate this with repeated JSRs to OSWRCH, loading the accumulator each time with one of the VDU numbers. In hex the call is VDU &1F, &14, &0C, &2A.

I've used a variant of Program VIII as a subroutine in its own right in Program IX.

The main program, which ends at the first RTS, repeatedly loads the accumulator with various Ascii characters then jumps to the subroutine at &2015. This subroutine uses OSWRCH to print out the accumulator and is then identical to Program VIII, using OSWRCH to give us a beep.

This time though, its RTS doesn't take us back to Basic, but to the instruction after the JSR that called the subroutine. Only when the 6502 encounters the terminating RTS at the end of the main program (after it's returned from the last JSR &2015) does the routine return to Basic.

I leave you to fathom out exactly what Program IX does. Be warned, it's the longest so far, so check your code carefully before you try running it.

```
Locations  Mnemonics   Opcodes
 2000      LDA #&42    A9 42
 2002      JSR &2015   20 15 20
 2005      LDA #&45    A9 45
 2007      JSR &2015   20 15 20
 200A      LDA #&45    A9 45
 200C      JSR &2015   20 15 20
 200F      LDA #&50    A9 50
 2011      JSR &2015   20 15 20
 2014      RTS         60
 2015      JSR &FFEE   20 EE FF
 2018      LDA #7      A9 07
 201A      JSR &FFEE   20 EE FF
 201D      RTS         60
```

Program IX

Finally, just as the BBC Micro has a routine to write a character on the screen, so it has one to GET a character from the keyboard. Called OSRDCH, it starts at &FFE0. It waits for a key to be pressed, then stores its Ascii value in the accumulator.

Program X simply waits for a key press with OSRDCH then prints it out with OSWRCH. Don't be worried if the screen goes blank at first when you run it – Hexer clears the screen before running your code.

```
Locations  Mnemonics   Opcodes
 2000      JSR &FFE0   20 E0 FF
 2003      JSR &FFEE   20 EE FF
 2006      RTS         60
```

Program X

● *That's plenty for one month. Next time we'll meet some other registers apart from the accumulator. In the meantime write in if you're having problems with anything I've covered so far – with an SAE if you want a personal reply, please.*

And don't forget, this is meant to be a hands on introduction to machine code. You won't learn anything if you don't try the programs out yourself, so get cracking!

Pages of memory

AS we've seen we specify addresses with four digit, two byte hex numbers such as &0006 and &FFEE. In all we can distinguish 65,536 different memory locations this way.

But often it's easier to talk about memory locations in chunks, just as it's easier to deal with a pound coin rather than a hundred pennies. Since we're using hexadecimal and binary we don't split things up into 100s but 256s. This isn't as daft as it sounds. Look at how the memory groups this way:

&0000-&00FF
&0100-&01FF
&0200-&02FF
&0300-&03FF

and so on . . . I think you can see the pattern. We call our groups pages, so a page of memory contains 256 locations.

As you'll have seen the start addresses of successive pages go up &0000, &0100, &0200 and so on. That is, the high byte of each successive page increases by one which is what you'd expect since there are 256 bytes to a page. We saw last time that you can consider the high byte of an address to be the 256s column.

Since the first 256 bytes have high byte &00, the next 256 bytes have high byte &01 and so on – we often distinguish between pages by specifying the high byte only.

That is:

&0000-&00FF page zero
&0100-&01FF page one
&0200-&02FF page two

up to:

&FF00-&FFFF page &FF

We shall see that on the 6502 page zero, or zero page as it's also known, is a very important section of memory.

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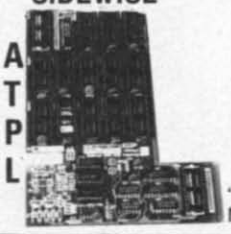

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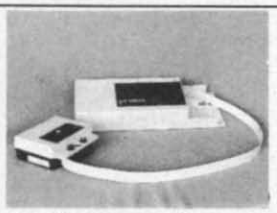

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THE TAMING OF THE TUBE

A LARGE proportion of commercial software is not Tube-compatible. This is usually due to accessing hardware or system workspace directly, or more rarely to misuse of the high-order address bytes in filing system calls.

To use these naughty programs, the 6502 second processor owner must switch off the Tube and press Ctrl+Break.

This article presents a less destructive approach to the needs of badly behaved programs, and allows work in the second processor to be suspended temporarily while a program in the I/O processor is used.

How about stopping in the middle of writing a document to consult a Tube-incompatible database, then picking up the text again without reloading it from file? Or a short pause for a game of Snapper?

The Basic program (Program I) assembles and saves the two utilities TUBEOFF and TUBEON. When needed these utilities should be used independently of the Basic program that created them. The program only saves the machine code files if the relevant checksums are correct.

When using any program in the second processor run the first utility using *TUBEOFF like any other star command. This uses software to switch off the Tube and starts up the current language in the I/O processor.

The machine can then be treated as if the Tube is not attached (with the exception that the second processor is restarted if Break is pressed). Almost any program will run in the way that it runs on a stand-alone BBC Micro.

Later the Tube can be switched on again by using *TUBEON and this returns the machine to exactly the point in the second processor program at which *TUBEOFF was invoked. From here, activities can resume as if nothing had happened.

In contrast to switching off then on again no data is lost or need be reloaded from a file.

A word of warning: *TUBEON can only be used to reverse the effects of *TUBEOFF, and should not be used on its own.

This raises the issue that with a second processor the current language as defined by the operating system is not necessarily the same as the language apparently running. If Hi-Pascal is run from disc and Break pressed this display often results:

```
Acorn TUBE 6502 64K

Acorn DFS

BASIC

%            (pascal prompt)
```

Here Basic is the current language and Pascal is the apparent language. *TUBEOFF starts the current language in the I/O processor whereas *TUBEON restarts the apparent language in the second processor.

These utilities should only be used with the 6502 second processor, because a Z80 running the CP/M operating system uses the I/O processor memory below &3000 (where *TUBEOFF and *TUBEON run) as a disc catalogue buffer.

While these utilities are fully relocatable and could run elsewhere in memory the buffer is likely to be corrupted by activities in the I/O processor whilst the Tube is dormant.

Disabling the Tube is fairly simple and can be achieved from the keyboard with the sequence:

```
*FX 234
*DFS     (the required filing system)
*BASIC   (the required language)
```

*TUBEOFF does this after checking there is at least one language in sideways ROM. Note that if the current language is a Hi version running from ROM then a crash is inevitable, as the ROM will not run in the I/O processor.

The soft font is not imploded (so any characters defined through VDU23 remain available) leaving 1½k less space between OSHWM and HIMEM than would be available on a stand alone BBC Micro.

For example, in Basic PAGE is set to &1F00 for a disc system instead of &1900. The space can be recovered and PAGE lowered to &1900 with:

```
*FX 20
*BASIC
```

Re-enabling the Tube from the keyboard is impossible in Basic. In theory, what's needed is:

```
*FX 20 6
*FX 234 255
*FX 143 255
*FX 143 254
*DFS
*BASIC
```

It won't work, as the Tube Host Software (THS) copied to zero-page and &400-&7FF by *FX 143,255 is corrupted before it can be used – Basic uses these areas as workspace.

*TUBEON is partly this sequence translated into assembly language, with a check to ensure the second processor is still there. A *No Tube* error is issued if it is disconnected for any reason.

Now a short digression. Usually the Tube system works something like this: When the second processor Tube operating system (TOS) wants to print a character on the screen (an OSWRCH call) it pushes that character into the Tube buffer and continues on its way.

If the TOS wants to do anything else it writes a request code into the Tube then sends in the necessary data (for example, code 8 followed by the contents of the A register and the parameter block for an OSWORD call)

From Page 75

and awaits the answer.

On the other (I/O) side the THS waits for commands from the TOS, executing a loop at location &36 that scans the Tube interface for signs of incomming data. If the THS reads a character from the Tube it is printed onto the screen.

If a request code is received that code defines what supplementary data to expect and what to do with it. The data is read and the job done, and then the answer pushed into the Tube and read out on the other (second processor) side by the TOS. This marks the completion of the exchange. The THS returns to &36, and the TOS goes on with its task.

Incidentally, processes like events or copying of large amounts of data from filing systems or sideways ROMs are not catered for in this scheme as the information transfer is interrupt controlled and involves a separate set of request codes.

Armed with this knowledge the difference between *TUBEON and the theoretical sequence described previously, can be understood. Instead of reselecting the current language, it relies on *TUBEOFF, or its keyboard equivalent, having been used.

This must have been executed via a call to the command line interpreter OSCLI, and since that time the second processor has waited for the end of its OSCLI call.

*TUBEON merely writes a byte to the Tube to inform the TOS that the OSCLI call has been completed and that it may continue on its way, then itself jumps to the main THS loop in zero page.

First the bad news. This is an undocumented, illegal feature. It may not work with future versions of the THS, as the main loop need not be at &0036 (this routine was written for the THS within Acorn DNFS 1.2/3.6).

The good news is that whatever the I/O processor was used for, whatever language was used, whatever program was run while the Tube was disabled, the old language is restarted in the second processor at exactly the point it was left.

*TUBEOFF can even be used inside a Basic program, and when *TUBEON is entered the program picks up from where it left off.

An alternative to this illegal code is to end the routine by provoking an error. This will be dealt with by the language running in the second processor. Type in the alterations in Program II and re-run the Basic program.

If this option is taken the resulting routine cannot be used transparently in situations where the illegal version would work. That is within a Basic program, the deliberate error would have to be trapped by a suitable ON ERROR statement testing for ERR=127. However it should work with future versions of the Tube host software.

A feature which might limit the use of *TUBEOFF and *TUBEON is that they result in the closure of any active *SPOOL or *EXEC files. This is because each utility reinitialises the current filing system using ROM service call 18 (equivalent to typing *DISC for example).

It is necessary because some filing systems keep a separate record of whether the Tube is active, rather than using the OS Tube presence flag.

If not reinitialised the filing system may call the THS when it is not there (after *TUBEOFF), or fail to use it when Tube communication is necessary (after *TUBEON). Don't despair, as with care, the problem can be circumvented. This *EXEC file will switch off the second processor then CHAIN a Basic program:

```
*KEY 0 *BASIC|MCHAIN"EXAMPLE"|M
*FX 138 0 128
*TUBEOFF
```

Were this file to be *EXECed, anything after *TUBEOFF would be ignored because the file would be closed, but the rest of the commands would be inserted into the keyboard buffer and obeyed after closure of the file.

The routines both load and run at &2F00. This area, just below the video RAM, is the most convenient for disc-based I/O processor utilities in a Tube system, providing they are less than, say, 1k long to avoid the ROM private workspace.

As the utilities are both relocatable and require no user RAM for variable storage they can easily be put into a sideways ROM or sideways RAM – not a language ROM as these run in the second processor – and selected with a simple star command.

Alternatively, the routines can be loaded from disc into any other free memory – change the last two address parameters in lines 550 and 1080 from &FFFF2F00 to whatever address is required. Note that the top bytes must be &FFFF to show the address is in the I/O processor.

Full listing starts on Page 113

PROBLEM

I BOUGHT the kit for the Real Time Clock *(The Micro User,* February 1984) at the Christmas Micro User Show. I encountered no problems with the construction, and using some software provided by a friend I was easily able to set the time and date.

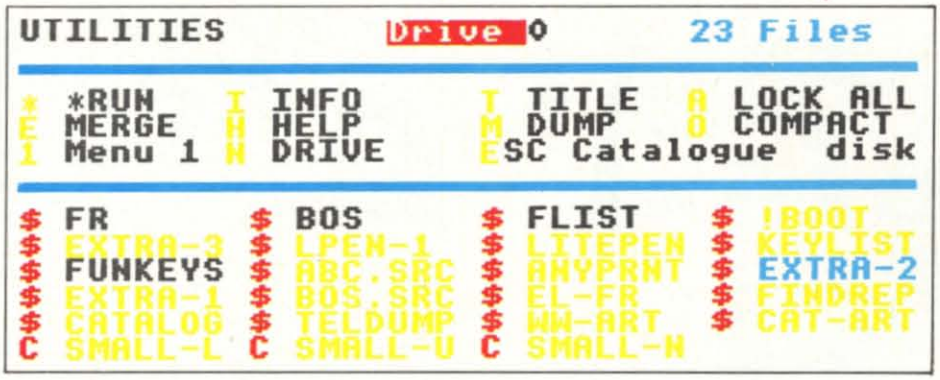
I have had the clock running for over a month now but unfortunately the best accuracy that I can obtain is a gain of about 10 seconds a day. A colleague at work also bought a kit at the same time and he is experiencing exactly the same errors.

We have both tried over the last month or so moving the vari-cap through its entire range, but 10 seconds gain a day is the smallest we can achieve. Can you help please? – G. Crawford, Crawley Down.

SOLVED

You will find that the variable capacitor goes to one side of the crystal. If you break the track and link it to the other side of the crystal you should be able to get the adjustment you need.

Some real time clock kits were sent out with a completely wrong errata sheet and it should be ignored.



CATALOG II

ROBIN and CHRIS NIXON present an interesting update on a popular *Micro User* program

YOU may remember Catalog, a program that automatically catalogues a disc and presents the user with a menu from which programs can be selected via single key entry. It appeared in the December 1984 *Micro User*.

The program included facilities to lock, unlock and delete files as well as format program listings and list PROCs and FNs in a file.

Well here is Catalog II, which incorporates many new features and alterations requested by readers. It also now uses some machine code routines and is therefore a good deal faster.

Catalog II will now enable you to quickly perform all the major disc operations at a single key press.

The two "features" discovered in Catalog to do with the change drive and formatted listing options have been corrected. Also, Catalog II will now work with the 6502 Second Processor.

If you wish to add further routines to the program you must check for a corresponding key press between lines 470 to 700 and act accordingly. New routines should be added to the end of the program.

To ensure clarity and ease of use you will probably have to create a third menu. The existing menus can be found between lines 310 and 390. You should also add a single line explaining your new routine to *PROChelp* (lines 2350-2380).

When entering the program put a REM before the ON ERROR statements in lines 450, 730, 890, 990, 1070, 1360, 1690 and 2390 until you have corrected any typing errors.

To get Catalog II to boot up automatically on Shift+Break create a !BOOT file by typing:

```
*BUILD !BOOT
MODE 7:CH."CATLOG2"
```

Then press Escape. Also, don't forget to do a:

```
*OPT 4 3
```

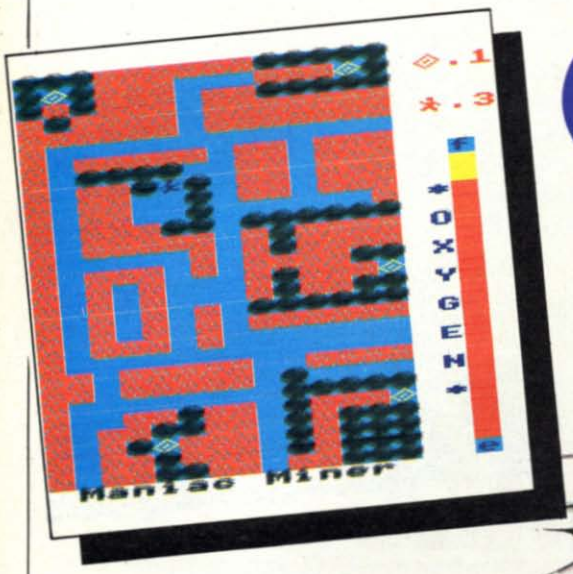
To set the boot option to EXEC. Ensure you save the program as *CATLOG2*.

```
100 REM ************************
110 REM *                      *
120 REM *      CATALOG 2       *
130 REM *                      *
140 REM *  R.Nixon & C.Nixon   *
150 REM * (c)  The Micro User  *
160 REM *                      *
170 REM ************************
180 REM
190 IF PAGE<>&1900 THEN PAGE=&1900:
CHAIN"CATALOG"
200 *FX3,0
210 *FX255,31
220 *TV0
230 *KEY10O.|M*FX11,20|M*FX12,2|M|V
7|NL.|M
```

Turn to Page 102

HERE is a description of the utilities provided by Catalog II. Since there are so many two separate menus are required.

- **1** *Display menu 1.*
- **2** *Display menu 2.*
- **A** *Lock all files.*
- **C** *Chain a program.*
- **D** *Delete a file.*
- **E** *Merge two programs.*
- **F** *Display formatted program listing.*
- **H** *Help.*
- **I** *Display file information.*
- **K** *Lock a file.*
- **L** *Load a program.*
- **M** *Dump a file to screen.*
- **N** *Change current drive.*
- **O** *Compact disc in current drive.*
- **P** *Display all PROCs and FNs in a program.*
- **T** *Title disc.*
- **U** *Unlock a file.*
- ***** **RUN a machine code program.*
- **ESC** *Catalogue disc in drive 0.*



CAVERN

By MICHAEL OGURCHAK

YOU have a tough task ahead guiding Cecil, a miner with cash flow problems, around an abandoned mine in search of a valuable collection of diamonds.

Perils in the form of huge boulders and lack of oxygen, not to mention mental stress, must be overcome. Cries of "It's impossible" are often heard . . .

Remember that pushing boulders and digging is strenuous work, so a lot of oxygen will be used up performing these tasks.

Pressing H will result in the screen being rebuilt, handy when you have trapped yourself or when you have made a diamond inaccessible. But it will also cost you one of your three lives.

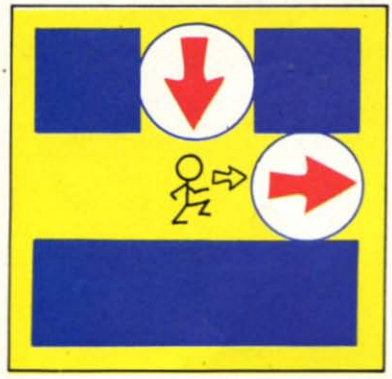
Other ways to hasten your doom are being crushed by a boulder and running out of oxygen.

You may think some of the screens are impossible but where there's a will there's a way. This is not a game just for alien zappers, as you will need some grey matter to solve the puzzles.

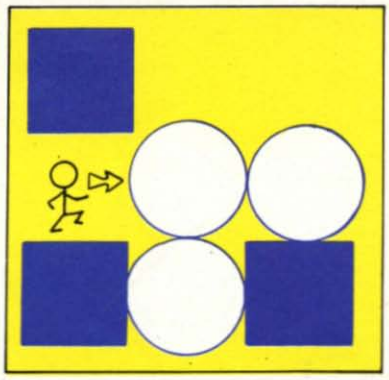
KEYS

Z - Left	] - Push
X - Right	S/Q - Sound/Quiet
* - UP	F/R - Freeze/Restore
? - Down	

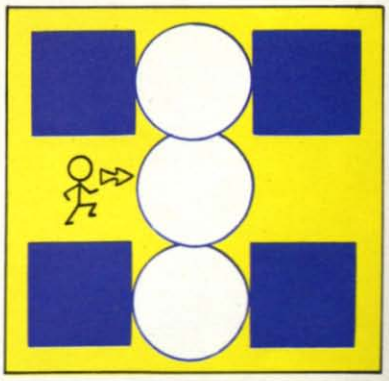
RULES OF THE GAME



If you push a boulder while holding up another one you will be crushed.



You cannot push a boulder if there is something behind it.



You cannot push a boulder if there is another boulder on top of it.

QUEST

PROCEDURES

newgame	Sets up variables for each game.
setup	Prints the display down the right hand side of the screen.
newscreen	Sets up variables for each new screen and prints appropriate screen.
chek	Main loop, checks for keys.
name	Prints name for each screen.
build	Builds each screen.
man	Prints man in starting position for each screen.
gem	Puts gems on the screen.
energy	Decreases energy and updates oxygen gauge.
hit	Checks to see if boulder can be pushed and moves it.
move	Checks if man can move and moves him.
lose	Called when a life is lost and resets variables; checks if game over.
gemf	Checks which diamond has been found and checks if screen is completed.
bolf	Routine for falling boulders.
end	Prints Game Over message and checks for high score.
bolabov	Checks if there is a boulder above you.
inst	Prints instructions and current high score.
freeze	Freeze routine.

VARIABLES

S%(6), T%(6)	X, Y coordinates of gem.
DIA%(6)	Flag for gems.
HS%	High score.
screen%	Screen.
lives%	Lives.
gem%	Amount of gems found score.
n%	Flag to see if H is pressed.
ea%	Flag to see if earth is in front of you.
ns%	Flag to see if all six screens have been completed.
sheet%	Screen number.
t%, s%	Determine which way boulders fall.
energy	Energy remaining.
d%	Moves oxygen gauge down.
tar%	Target for energy. When reached one block energy is lost.
A	Flag for building screens.
M%	Determines which man character is printed.
A%,B%	Added to X, Y coordinates when you move.
C%,D%	Old coordinates before you move.
X%,Y%	New coordinates when you move.
G%	Flag to see if boulder is above you.
S%	Flag to see if boulder is not in your way.
U%	Amount of boulders on top of each other when falling.
L%	Loop variable.
K%	Flag.
I%	Flag.
k%	Loop variable.
P%	Flag.
Z%, V%	Added to X, Y coordinates to see if you can push a boulder.
cave%	Previous screen number.

```
10 REM Cavern Quest
20 REM By Marcel Ogurchak
30 REM (c) The Micro User
40 MODE2
50 ENVELOPE1,2,0,0,0,0,0,0,126,-1,
0,-3,120,0
60 VDU23,224,&18,&18,&48,&3C,&1A,&
38,&6C,&04
70 VDU23,225,&18,&18,&12,&3C,&58,&
1C,&36,&20
80 VDU23,226,&18,&18,&18,&7E,&18,&
1C,&74,&46
90 VDU23,227,&18,&18,&08,&7E,&18,&
38,&2E,&62
100 VDU23,228,&3C,&76,&FB,&FF,&FF,&
FF,&7E,&3C
110 VDU23,229,&08,&14,&22,&49,&92,&
44,&28,&10
120 VDU23,230,&FF,&DF,&FB,&EF,&FD,&
BF,&F7,&7F
130 VDU23,1,0;0;0;0;
140 DIM S%(6):DIM T%(6):DIM DIA%(6)
:HS%=0:gem%=0
150 REPEAT
160 PROCinst:PROCnewgame:PROCsetup:
PROCnewscreen:PROCchek
170 UNTIL FALSE
180 DEFPROCnewgame
190 COLOUR135:CLS
200 screen%=-1:cave%=0:lives%=3:gem
%=0:n%=0:ea%=0:ns%=0
210 ENDPROC
220 DEFPROCnewscreen
230 FOR Q%=1 TO 6:DIA%(Q%)=1:NEXT
240 screen%=screen%+1
250 IF screen%>5 THEN ns%=1
260 IF ns%=1 THEN cave%=(screen%-1)
:screen%=(RND(6)-1)
270 IF ns%=1 AND screen%=cave% THEN
260
280 IF screen%<3 THEN sheet%=screen
%:t%=-1:s%=1 ELSE sheet%=screen%-3:t%
=1:s%=-1
290 energy=200:d%=0:tar%=190
300 PROCname:PROCbuild:PROCman
310 ENDPROC
320 DEFPROCbuild
330 VDU28,1,29,14,1:COLOUR134
340 IF n%=0 THEN CLS
350 RESTORE 2070:REPEAT:READA%:UNTI
L A%=sheet%+101
360 FOR O%=0 TO 404:READ A
370 IF A=0 THEN COLOUR6:PRINT" ";
380 IF A=1 THEN COLOUR1:PRINTCHR$23
0;
390 IF A=2 THEN COLOUR0:PRINTCHR$22
8;
400 NEXT
410 VDU28,0,31,19,0
420 PRINTTAB(14,29);CHR$228
430 PROCgem
440 ENDPROC
450 DEFPROCgem
460 COLOUR11:COLOUR134
470 RESTORE 2000:REPEAT:READA%:UNTI
L A%=sheet%+101
480 FOR G%=1 TO 6
490 READ S%(G%),T%(G%)
500 IF DIA%(G%)=1 THEN PRINTTAB(S%(
G%),T%(G%));CHR$133
```

Turn to Page 110

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4-SITE

By ROBIN NIXON

4-SITE is a game similar to noughts and crosses except that the object is to get four counters in a row in three dimensions using four levels.

As you might imagine the complexity of the game is greatly increased from that of noughts and crosses. It may be that it is still possible to always force a drawn game, but I have not discovered an algorithm that does so. No doubt our astute readers will provide one.

The four playing boards are shown on the screen as diamonds in a two dimensional representation of a three dimensional stack of boards, rather than as four separate squares. Although this may appear a little confusing at first it does in fact help to improve clarity.

The method of input is fairly unusual, but is simpler than ordinary input as each level of input is displayed on the screen as you go along.

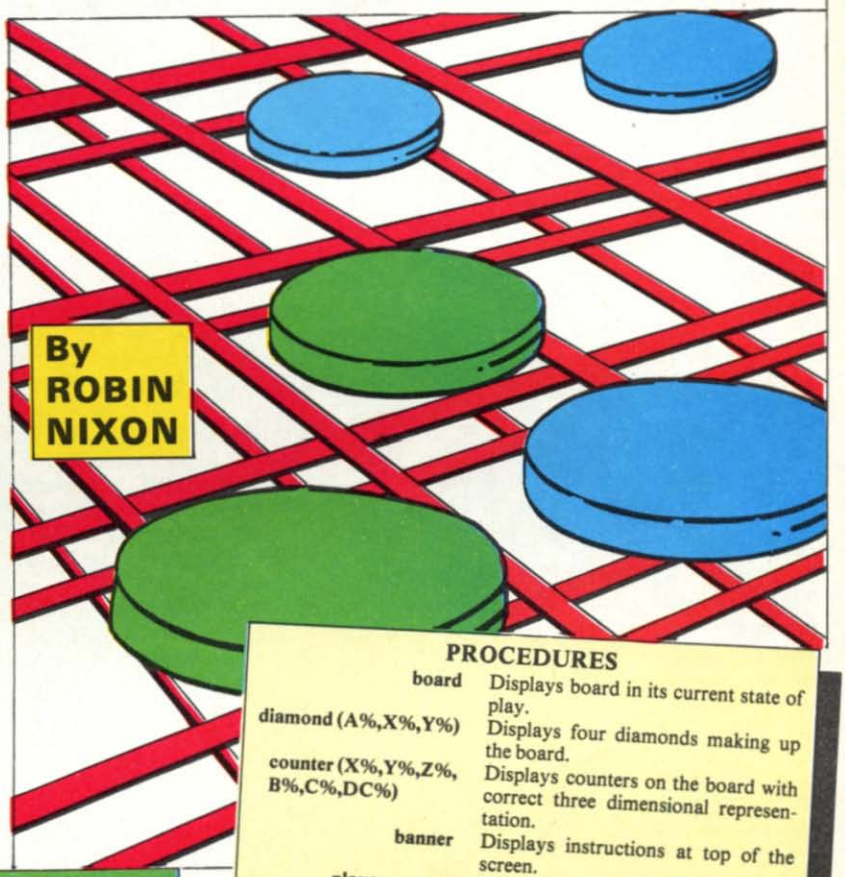
To play a counter first select the level you want by pressing the Spacebar until the level is highlighted, then press return.

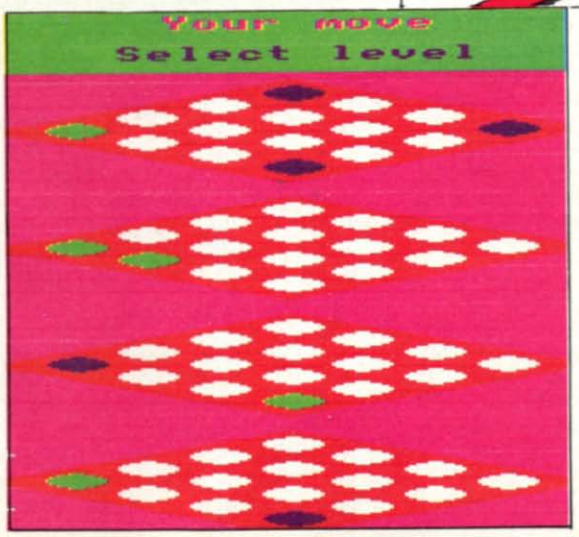
Next, select the column you want by pressing the Spacebar, then press Return.

Finally select the position to play on in that column and press Return.

As well as being simpler, this method has the advantage that disabled people, with switches connected to the fire buttons on the joystick port of their BBC Micro, can also play this game without changes being made. Switch 1 replaces the Spacebar and switch 2 the Return key.

Full listing starts on Page 106





PROCEDURES

board	Displays board in its current state of play.
diamond (A%,X%,Y%)	Displays four diamonds making up the board.
counter (X%,Y%,Z%, B%,C%,DC%)	Displays counters on the board with correct three dimensional representation.
banner	Displays instructions at top of the screen.
players_move	Player's input routine.
choose_level	Used by the player's input routine to select a level.
hi_lite (C%)	Highlights chosen counter.
choose_row	Used by input routine to select a row.
choose_play	Selects final position of the player's move.
clear_b	Clears the array *B%(4,4,4)* after it has been used temporarily to store the board.
computer_play	The computer's play routine.
count	Works out number of counters each player has.
weight	Assesses value of certain moves.
add_weight (X1%,Y1%,Z1%)	Adjusts values accorded to moves already assessed.
game_over	End of game.
title	Displays title and instructions.
continue	Waits for a key to be pressed before continuing.

THE MASTER COMMANDS

PETER JOHNSON looks at the expanded machine operating system which the BBC Master series incorporates

ONE of the Master series enhancements is the increase in the size allocated to the machine operating system which used to be just under 16k and now occupies over 32k.

There are various reasons for this increase. The MOS contains much better screen drivers, giving circles and flood fills, drivers for new bits of hardware such as the real-time clock, and several new star commands. So let's take a look at these improvements.

Before I talk about the Command Line Interpreter (CLI) itself, a word about temporary filing systems would not go amiss.

As you probably know, the BBC Micro can switch between filing systems using the appropriate star command, such as *DISC and *TAPE. You can also select a filing system using *FX143,18,[fs num] where [fs num] is the Acorn-allocated number for that filing system.

When you press Break on a Master the currently selected filing system stays selected. This differs from the action on the standard BBC Micro where the highest priority filing system would be selected.

The other difference on the Master is that you can specify the filing system as part of a filename. The filing system name precedes the filename and is placed between – characters. It is selected temporarily for the duration of the operation and then the permanent filing system is reselected automatically.

For example, suppose you're in Basic and using the ADFS and want to load a program off the Econet file server. You would type:

```
LOAD"-NET-fred"
```

where *fred* is the program name. The net would be selected while *fred* is loaded and then the ADFS would be reselected before control is passed back to Basic. Another example is opening a file:

```
ch=OPENIN"-DISC-F.FILE"
```

ch would have the DFS channel number of *F.FILE* assigned to it. Now if you said:

```
PTR@ch=&100
```

in order to set the pointer for *F.FRED* 256 bytes into the file on the standard BBC Micro this would give a channel error, as *ch* isn't a channel on the ADFS.

However the Master automatically pages in the filing system that *ch* belongs to, so you can manipulate open file on any filing system, regardless of the current one.

This switching of filing systems is performed by the MOS and whenever you call one of the filing system functions a JSR is made to an address in page &FF. This address is a JMP indirect through a vector in page &2 to the actual routine.

Not any more! The Master MOS actually jumps to a place in the MOS ROM which sorts out any temporary filing system stuff by looking at the approprite filename or channel before jumping through the vector.

One final place where the MOS looks for temporary filing system names is at the start of a star command line. So if the first thing on a command line is *-FSNAME-*, the appropriate filing system is selected for the rest of the command, or until another temporary filing system is selected in a filename.

A new command which nicely illustrates the temporary filing system facility is *LIBFS. This sets the library filing system to be the temporary filing system. Libraries will be familiar to users of DFS, ADFS and NFS. When you type a command like:

```
*FORMAT
```

which isn't a built-in command, the filing first looks in the current directory for a file called FORMAT which it can *RUN. If there isn't one it tries the current library directory instead.

For example, on the NFS it might try to *RUN $.LIBRARY.FORMAT. On the BBC Micro, if it doesn't have any luck there it gives up with a "Bad command" error. On the Master the MOS has one last attempt at finding the command temporarily switching in the library filing system and trying the command again.

An example will make this clearer. Suppose you are using the DFS for compatibility with BBC machines, but have some useful utilities on the ADFS disc in the other drive which you want to use from time to time. You would type:

```
*-ADFS-LIBFS  Make ADFS the library
filing system
*DISC         Make DFS the current
filing system
*LIB L        Make L the DFS library
```

After all this, an unknown command *FOO would have the following candidates for execution:

```
-DFS-FOO
-DFS-L.FOO
-ADFS-:1.$.FOO
-ADFS-:1.LIBRARY.FOO
```

assuming that the current directory and library on the ADFS are :1.$ and :1.$.LIBRARY respectively. Only if none of those files existed would the "Bad command" error be given.

A final use for temporary filing systems at the start of a command line is to access FS-specific commands such as *MOUNT. To mount drive 1 on the ADFS when the DFS is selected, you would use:

```
*-ADFS-MOUNT 1
```

The FS names recognised by the MOS are *-DISC-*, *-ADFS-*, *-TAPE-*, *-CFS-* and *-NET-* (when the network ROM is fitted). There is a new ROM service call to enable the writers of other filing systems to specify their own temporary name string and channel number range.

Now the temporary filing systems are

out of the way, I'll describe the rest of the commands in the order in which they are printed by the command:

***HELP MOS**

Although the MOS now has its own *HELP information all it gives is a list of commands, without any clue as to the syntax.

Some of the commands listed below are not new, so I'll just mention them for completeness. Others are not new in themselves, but used to be implemented by other pieces of software – for example the filing systems. These will be described in a little more detail.

Most attention will be paid to the totally new commands, such as *APPEND.

***CAT** is the first command in the list, and simply tells the current filing system to produce a catalogue. Don't forget that the current filing system can be a temporary one just for the command, so you can say:

```
*-NFS-CAT
```

to get a catalogue of th fileserver regardless of the current permanent filing system. The reason that *CAT is first in a list which is otherwise in fairly good alphabetical order is to ensure that *. also gets trapped as *CAT.

In MOS 1.20 *. was a special command with its own entry in the MOS's table. Now it just comes out in the wash from *CAT's position.

***ADFS** selects the ADFS as the permanent filing system. It used to be recognised by the filing system itself, but now the MOS does it.

A notable feature of the Master is that the filing system is remembered when you press Break. On the BBC Micro it always reverts to the highest priority one unless you override it by pressing a key, for example A + Break.

***APPEND** is like *BUILD except that the text typed is appended to the named file. So if you've already *BUILDed(!) some text to a file called *text* and want to add some more, you would say:

```
*APPEND fred
```

(text typed gets added to the end of *fred* until Escape is pressed)

Technically, *APPEND OPENUPs the file, then makes the PTR equal to its EXT before it starts to BPUT to it.

*BUILD just OPENOUTs the file.

***BASIC** calls the Basic ROM. By rights Basic should have service code to recognise its name and call itself, but Roger Wilson has always insisted that the space to do that is better used implementing extra bits of Basic, and left the star command handling to the MOS.

***BUILD** used to be a utility found in the DFS ROM. It takes a filename and lets you create the contents of the file by typing it a line at a time.

The major enhancement in the Master's MOS-based version is that the line can contain control codes using the Acorn standard escape sequences, as used in *KEY commands. For example, to do a palette change in a !Boot file, you could say:

```
*BUILD !Boot
0001 !S!0!D!0!0!0!S!A!0!0!0
0002 [ESCAPE]
```

The !S and so on are converted into the appropriate control codes which when *EXECed – and echoed by the line input routine – have the same effect as VDU 19 commands. For more information on the escape sequences see the GSREAD entry in the Advanced User Guide.

When OPENOUT – used by *SPOOL and *BUILD – creates a file, it sets the execution address to &FFFFFFFF. This is very handy, as on the ADFS and ANFS, *RUNning a file with this execution address causes it to be *EXECed instead. Thus in the example above you can say *!Boot as shorthand for *EXEC !Boot.

***CLOSE** is a command which closes all open files on the current filing system. It is like CLOSE#0 from Basic, and is useful when you can't save a file, in Edit or View for example, because you've forgotten to close it earlier and get an "Open" error.

***CONFIGURE** is one of the genuinely new and interesting commands. It lets you set many of the options which are read from the real-time clock chip's CMOS RAM on a hard reset (Ctrl+Break or power-on, but NOT just Break). There are a lot of options and they are listed by typing:

```
*CONFIGURE
```

or

```
*CO.
```

Table I lists them for completeness, but see the appropriate Acorn documentation for more details.

Where a number range is indicated no range checking is done so 0-255 are accepted, but numbers out of the range might give strange results.

Hex can be used. For example:

```
*CO. LANG &E
```

For a list of sideways ROMs see *ROMS.

***CODE** is the same little used call to the user vector.

***CREATE** takes a filename and a hexadecimal length and creates the file of that length, filled with zeros. For instance:

```
*CREATE empty 1000
```

creates a directory entry called *empty*. Note that the contents of the file aren't initialised, only the directory entry, so it isn't the same as OPENOUTing the file and setting PTR (or EXT) to &1000.

This command uses the OSFILE with A=7 call, which is supported by ADFS and ANFS. Like *SAVE, *CREATE can also take an optional execution and re-load address.

***DUMP** dumps in hex and Ascii the contents of a named file. An optional starting offset into the file may be given. For example:

```
*DUMP fred 1FF
```

will start from the 512th byte of *fred*. This used to be in DFS utilities in a simpler form.

***DELETE** also used to be a filing system command. Now the MOS traps it and does the appropriate OSFILE with A=6 to delete the named file.

***EXEC** reads the named file as if its contents were being typed. *EXEC without a filename closes the current *EXEC file.

***EX** gives long catalogue information about all the files in a named directory, or the current directory if none is given.

***FX** is the old favourite. It should crop up less often now because many of the

From Page 83

things that you used to set with *FX are now stored in CMOS RAM.

***GOIO,*GO.** Cause execution to start at a given (hex) address, like CALL from Basic. *GOIO calls an address in the main machine and *GO calls and address in the second processor (or the main machine if there is no second processor). An example is:

```
*GO F800
```

which enters the star prompt loop in the 6502 second processor. *GOIO is particularly useful for starting off a program in the IO processor which has been poked in over the Tube using the OSWORD 6 call. Previously this was difficult to do.

***HELP** is as always, with the addition of the MOS help text. It is useful to know that all ROMs should respond to the *HELP title, so *H. . should produce all the help available.

***INFO** asks the filing system to provide long-form information on a possibly wildcarded filename. Different filing systems use different formats for the information, and also treat wildcards differently. For example in response to:

```
*INFO fred*
```

the ADFS and DFS would produce information on all filenames in the current directory beginning with *fred* whereas the NFS would only give information on the first entry beginning with *fred*.

***IGNORE** [0-255] is exactly the same as *FX6,[0-255]. That is, it sets the printer ignore character, except that

***CO. BAUD [0-8]** Sets the default *FX7 and *FX8 RS423 rates. 0 is as 7.

***CO. BOOT** Causes an auto-boot on Break but not Shift+Break.

***CO. NOBOOT** Causes an auto-boot on Shift+Break but not Break.

***CO. CAPS** Causes the Caps Lock LED to come on after a Break.

***CO. NOCAPS** Causes the Caps Lock LED to not come on after a Break.

***CO. SHCAPS** Sets the Shift Caps Lock (not Shift Lock) mode after a Break.

***CO. data [0-7]** Sets the default RS423 data format thus:

parameter	data bits	parity type	stop bits
0	7	even	2
1	7	odd	2
2	7	even	1
3	7	odd	1
4	8	none	2
5	8	none	1
6	8	even	1
7	8	odd	1

(In fact the value is the default setting for bits 2-4 or the 6850 control register; see the Advanced User Guide, Page 388.)

***CO. DELAY [0-255]** Sets the default initial auto-repeat delay (*FX11).

***CO. REPEAT [1-255]** Sets the default auto-repeat speed (*FX12).

***CO. DIR** Makes the ADFS read a directory from the disc when selected.

***CO. NODIR** Prevents this. The ADFS will start with "Dir. None" selected.

***CO. EXTUBE** Uses the external 2nd processor port, ignoring the internal one.

***CO. INTUBE** Uses the internal coprocessor port, ignoring the external one.

***CO. FDRIVE [0-3]** Sets the floppy drive options for the ADFS thus:

parameter	step time	precompensation on
0	6ms	no
1	30ms	no
2	6ms	yes
3	30ms	yes

***CO. FILE [0-15]** Sets the sideways ROM number of the default file system.

***CO. FLOPPY** Sets the default ADFS drive to :4 (floppy drive 0).

***CO. HARD** Sets the default ADFS drive to :0 (Winchester drive if fitted).

***CO. IGNORE [0-255]** Sets the default printer ignore character. If there is no number after the IGNORE all characters will be sent to the printer.

***CO. LANG [0-15]** Sets the sideways ROM number of the default language.

***CO. LOUD** Causes a hard-reset beep to occur and gives a loud VDU 7 beep.

***CO. QUIET** Suppresses the hard-reset beep and gives a quiet VDU 7 beep.

***CO. MODE [0-7, 128-135]** Sets the default display mode including the ability to set a temporary shadow mode.

***CO. SCROLL** Selects the 20/40/80 column modes.

***CO. NOSCROLL** Selects the pseudo-21/41/81 column modes.

***CO. TUBE** Enables the second processor to be recognised and used.

***CO. NOTUBE** Allows the second processor to be ignored, even if fitted internally.

***CO. PRINT [0-4]** Sets the default *FX5 printer type.

***CO. TV [0-255, 0-255]** Sets the default *TV settings. If one or both of the numbers are omitted, zero is assumed, as with *TV itself.

Table 1: The * CONFIGURE commands

*IGNORE on its own indicates that there is no ignore character. The default for this is read from the CMOS RAM at a hard reset (see *CO. IGNORE).

***INSERT** and ***UNPLUG** are both followed by a sideways ROM number in the range 0-15 (&0-&F). *INSERT causes that ROM to be recognised in subsequent ROM scans (which happen at hard resets when the computer ascertains which sideways ROMs are installed).

*UNPLUG causes the given ROM to be removed from the system without having to physically unplug it (which is impossible). It is useful for avoiding command name and ROM workspace clashes.

***LIBFS** sets the library filing system as explained earlier.

***KEY** sets a softkey definition.

***LOAD** loads a named file optionally at a given address in memory.

***LIST** acts as *TYPE described below, but adds line numbers to the start of each line.

***LINE** is used almost as often as *CODE and is explained in the BBC Micro Advanced User Guide.

***MOTOR** turns the cassette relay on and off, even though you can't see the effect anymore as they've made the motor LED a power indicator on the Master machine.

***MOVE** is a very useful file transfer utility. It takes the form:

```
*MOVE [from] [to]
```

So to copy a file called *fred* to one called *jim* (keeping *fred),* this would be used:

```
*MOVE fred jim
```

Of course temporary filing systems can be included in the filenames, so copying your cassette files to disc is now a piece of cake:

```
*MOVE -TAPE-file1 -ADFS-copies.file1
```

The *MOVE command uses the OSGBPB calls to read and write a block of bytes from the current PTR. The cassette filing system has been enhanced to include these calls so that *MOVE will work with it.

***OPT** is the general purpose filing system command with various effects. Don't forget you can now easily set the options on a non-current filing system, for instance, -TAPE-OPT1,1.

***PRINT** takes a filename and prints the contents of the file on to the screen. It's roughly equivalent to the Basic:

```
REPEAT VDU BGET#file:UNTIL EOF#file
```

but has more intelligent handling of carriage-return/line-feed combinations.

***RUN** and ***/** execute a file as before, with the addition of searching the library filing system if necessary.

***REMOVE** is like *DELETE with the dramatic exception that it doesn't abort with a "Not found" error if the specified file didn't actually exist. This means that a Basic program could:

```
*REMOVE fred
```

without having to worry about errors occurring if *fred* didn't exist.

***ROM** selects the much used ROM filing system. Now that the Master machine has cartridge slots it could be that people start to produce programs in *ROM format, but I think that paged service or language ROMs are almost always a better choice.

***ROMS** is a utility which lists the 16 sideways sockets and their contents. For each ROM slot, the number in hex, the name of the ROM (or ? if there isn't a ROM in that slot), and whether the ROM is unplugged, is printed.

***SHUT** is similar to *CLOSE but closes all files on *all* filing systems, not just the current one. It actually generates a sideways ROM call telling the filings systems to temporarily activate themselves and do a *CLOSE operation.

***SAVE** saves a section of memory in a given file from a given address and of a given length, with the execution and re-load addresses optionally specified.

***SHADOW** is followed by a non-zero parameter to disable automatic shadow mode at the next mode change or else by 0 or nothing to enable shadow mode.

In shadow mode 128 is automatically added to mode numbers in the range 0-7 to make them shadow modes. Note that there is no way of configuring the machine to start-up in shadow mode.

***SHOW** is followed by a number in the range 0-15 (&0-&F) and prints the contents of that softkey's programmed string in quotes. This is useful for editing the contents of softkeys using cursor editing.

***SPOOL** with a filename opens a *SPOOL file to which all subsequent VDU output is also sent. The *SPOOL file is closed by *SPOOL without a filename or *CLOSE or *SHUT.

***SPOOLON** is like *SPOOL except that the text printed to the screen is spooled to the end of the named file. So if you've already *SPOOLed some text to a file called *fred* and want to add some more, you would say:

```
*SPOOLON fred
```

(text sent to the screen gets added to the end of *fred*).

```
*SPOOL
```

or:

```
*SPOOLON
```

will close the file.

The action of *SPOOLON is analogous to *APPEND.

***STATUS** tells you the current *CONFIGURE options. *STATUS followed by a particular parameter gives the status for that parameter while *STATUS on its own gives all of the current settings.

***TAPE** selects the cassette filing system.

***TV** sets the interlace and vertical sync settings at the next mode change.

***TIME** prints the current time from the real-time clock, in exactly the same format as:

```
PRINT TIME$
```

from Basic, but being a star command it can be used from almost anywhere, for example from View or Edit.

***TYPE** is like *PRINT except that control codes are not sent to the VDU directly but encoded in GSREAD format first to make them printable. This means that View files, which tend to have lots of strange control codes, can be *TYPEd without ruining the screen.

TAB(CTRL+I) would be printed as |I, carriage return as |M and so on. In addition, after a |M a new line is printed, so that the contents of the file aren't all printed on the same line. *TYPE is also useful for looking for text strings in machine code files.

***X** is used when you switch between internal and external tubes. You have to press Break immediately after using it.

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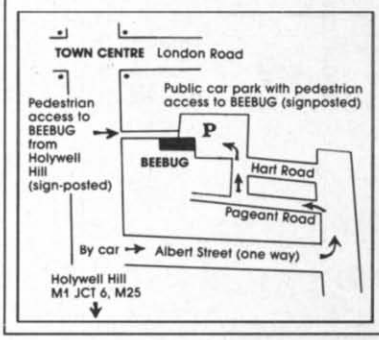

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This is Alice's last adventure column and we would like to thank her for her contributions over the last couple of years. She deserves a well earned rest. Her column will be taken over by someone equally dedicated to adventuring, the Mad Hatter, and he will be just as willing to solve any of your adventure-related problems. Drop him a line c/o Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Enclose an SAE if you would like a personal reply.

A computerised year in the life of Adrian Mole

THE Secret Diary of Adrian Mole aged 13¾ must be one of the most read and least secret books of recent years. To say that Adrian is a supercilious, arrogant prig is to merely confirm the intention of the real author, Sue Lloyd.

Pete Austin, of Level 9, has collaborated with Mosaic to produce the computer game of this affront to masculinity. It comes in 12 sections, each representing a month in Adrian's most critical year.

You start on January 1 and the aim is to make the little creep as popular, or as loathed, as possible.

To do this you make choices from 1 to 3 at various stages. Although the choices occur in random order at random times there are certain, crucial events which will always happen on the same date.

For example, you start with 40 per cent popularity and you might, between New Year's day and January 13 have tongue ache or a spot – but not both. If you have a spot then you can either squeeze it, hide it or ignore it. If neither affliction occurs it will pop up randomly later in the game.

Whenever the triple choice is given you can also save the game so this is a method of making and checking progress – choose, and if the score drops, restore and choose differently.

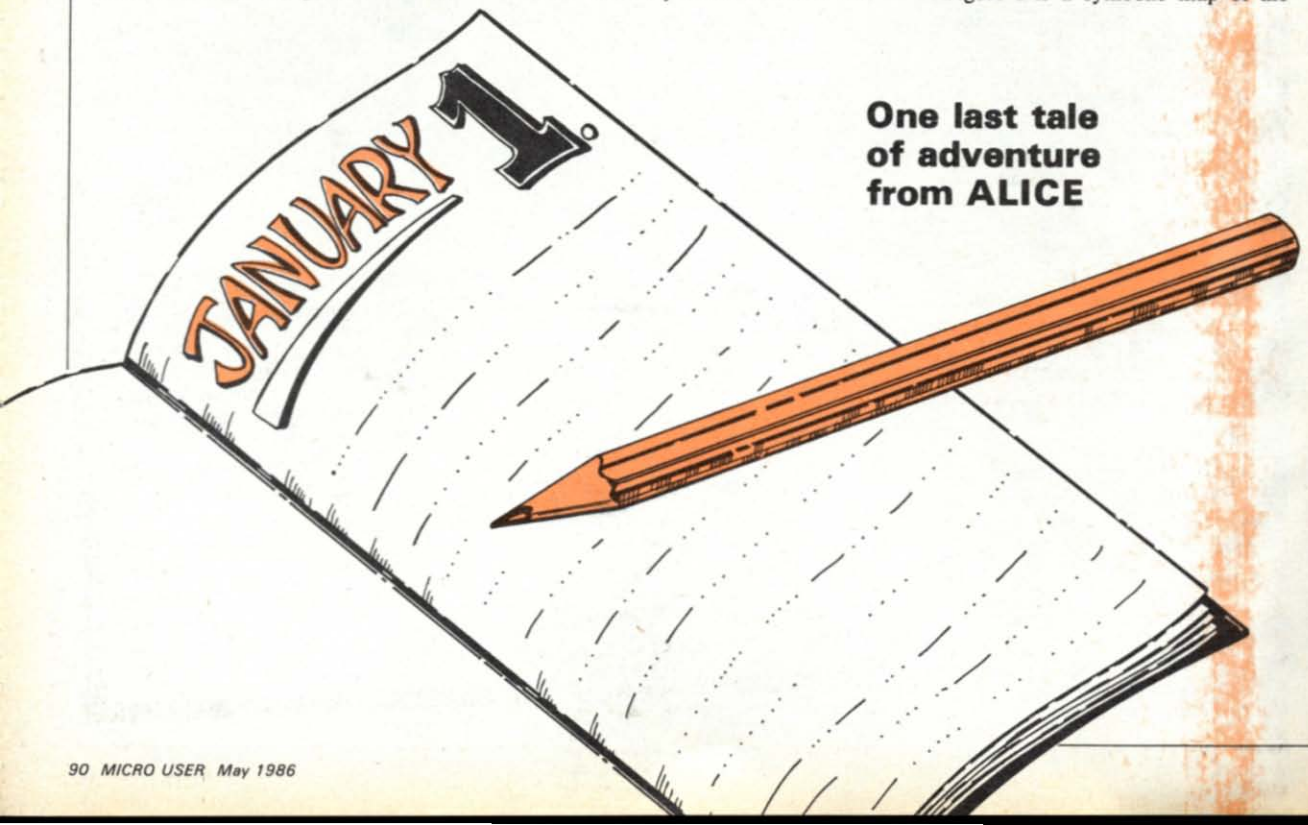
Most of the time a slightly different scenario unfolds with each choice, but, come January 14, Adrian always notes that he has seen a new girl at school called Pandora, the one who is to be the love of his pathetic life.

Other characters like Bert Baxter, the disgusting old boozer and chain smoker, will always appear at the same time, but how they behave or react depends on your selections.

It is all cleverly done and a real tour de force in text compression – some 200k of text has been packed into the 12 sections – and Pete Austin has written a lot of new disasters, mishaps and soliloquies à la Molesque, so if you like the little wimp you'll probably enjoy this game. But this is not a real adventure and I have never found Adrian very amusing.

I've been busy working out the solution to Alien 8 by Ultimate. This arcade adventure is full of visual puzzles and the only way to solve it in the time limit is to draw and analyse a map.

Figure I is a symbolic map of the



One last tale of adventure from ALICE

Alien 8 spaceship showing the 128 rooms and how they connect. You will see that there are 24 PLUG rooms (these are circled) and 36 VALVE rooms (just the numbers 1 to 4).

The aim is to collect and insert 24 of the valves into their respective plugs, but this is complicated by starting you randomly in one of four different rooms (marked S) and mixing up the valves in four different ways.

I consider the map to give the easiest starting scatter pattern for the valves, and if you modulo add 1 to each valve (that is 1→2, 2→3, 3→4 and 4→1) you will get three other start patterns for them.

A final, fiendish, complication is that two similar valves are replaced by EXTRA LIVES which, more often than not, are a nuisance because then you have only seven of that type to fit in the six plugs and some of the valves can be tricky to get at – I find room D5 particularly tricky.

So one of my initial aims is to discover which type of valve is short lived and then make allowances. Apart from that I find it much easier to travel round the ship, particularly in the south, in an anticlockwise direction (follow the arrows) and that a start near the middle is best and a start at the bottom is worst – I usually abort on that one.

Having done the analysis I still had to learn how to get and fit the valves, which is the real appeal of the game because in almost all cases there is a quick or easy way.

For example, many rooms have land mines, and the fast method is to drop and push a valve through them. This means that the only time you need to waste time guiding a robot is in room G12.

Another simplification is to avoid certain rooms. These are marked with an X.

A few more specific tips. To get the object in room E6 you face it, move back one step, drop a valve, move back three steps (the maximum without falling off) face the object and jump long then short.

In E7 you get the object by having a space between the two valves you are carrying. Many people fail to find the valve in room C8, jump on to the right

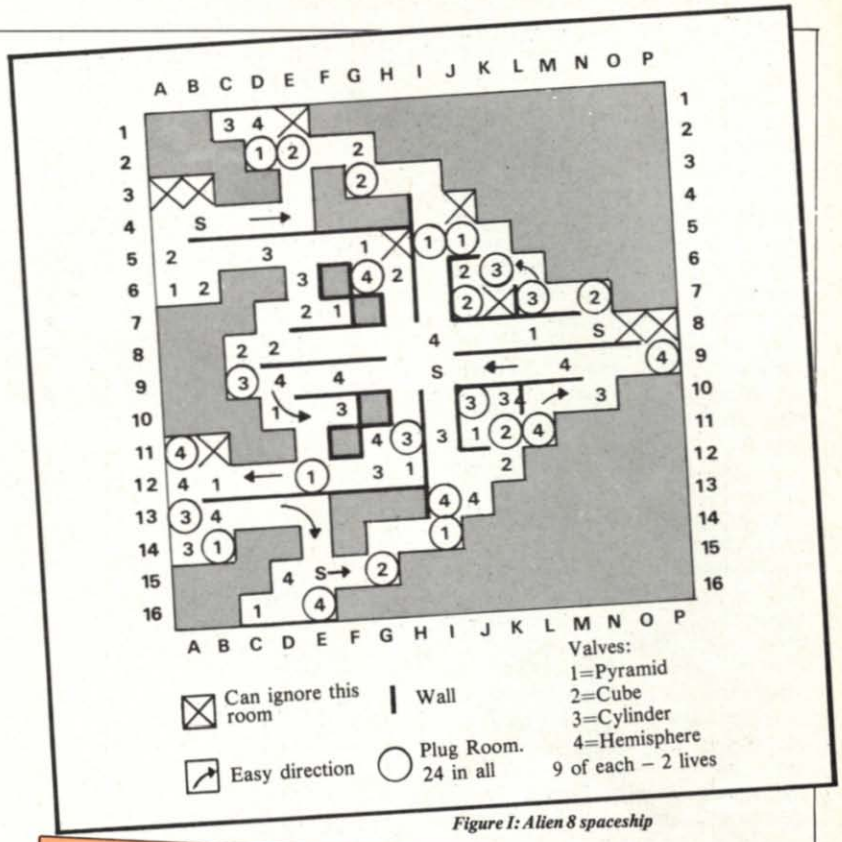


Figure I: Alien 8 spaceship

READERS TIPS

HERE are a couple of ways to do better with Level 9's Red Moon from G. Williams, of Leicester:

How to decompile the messages from the text handler:

```
*LOAD MOON3

*LOAD MOON4
?&6A8A=&60:CALL &6A30: ?&6A8A=&20

FOR A%=1 TO 65535: !&72=A%: CALL
&6C36: CALL &6B87: NEXT
```

In brief, ?&72,73 contains the message number to be printed, CALL &6C36 sets up a pointer to the start of the message and CALL &6B87 decodes and prints the message. If you want to get a print out of this then I would advise doing: ?&6CC4=79 first which sets the maximum length of the line to 79.

How to attain immortality: **Combat is OK provided victory is certain. I wrote it because I got tired of overcoming my enemy only to have to face his ghost just around the next corner.**

If I want to combat I'll play D&D but in a computer adventure I'd rather be faced with a puzzle:

```
P%=&6A8D:[JMP &C00:]

P%=&C00:[LDA #50: STA &1318:
SEC: PLA :SBC #3: JMP &6A91:]

CALL &6A30
```

The explanation is pretty simple. &6A8D is the start of the interpreter's main loop. I've added a bit of code here which sets your hit points to 50 so, unless your foe does you massive damage with one blow you should be safe.

The remainder of the code, called a blister, is the piece I wrote over at &6A8D.

Nice tricks and interesting, but they don't solve all the problems, because Gray Williams can't find the crown. I'm afraid I don't know either, so why not get the Level 9 hint sheet – or does that spoil the game?

From Page 91

hand column and destroy it, then go inside.

The same is true of the valve in G5 – it's hidden inside the blocks and you have to jump inside to find it.

To get the seemingly impossible valve in K12 you just need to get as close as possible – like an octopus the valves can squeeze through tiny gaps.

To survive in room N9 just enter, stand on a valve to protect you from the mouse and then jump over the intelligent robot on to the safe, central stage. This never fails.

When going West from here don't bother to twist about in room L9 – just straight jump short, short then long.

A final tip is that often the plugs seem impossible to reach – rooms I14 and G15 are examples – in which case you must drop the correct valve and then take a ride on it up to the plug.

With a bit of practice you too should be able to fit all 24 plugs before the time runs out and get the congratulatory poem plus your robot dipped in a marmite of oil ready for another go.

My fastest time was just under 450 light years, but the starting conditions were ideal. The layout of valves was as shown in Figure I (you can verify why this is the best layout) the start was near the middle and the two spare lives were, very unusually, in convenient places.

SOLUTIONS

Answers to Derlien's puzzle continue to arrive. I have now received (mid February) about 50 and here is a solution that I consider shows the most understanding.

You may recall there are two possible ways of stopping the program numberly to divide 5823 into 17469 or divide 5832 into 17496. The clue was "These confound me and I confirm your mental abilities" (indicating the first possibility) and the most subtle answer came from A.M. Simpson of Perth:

"Basic numeracy may be a benefit when computing answer". This is so apt that maybe it is **the** *answer.*

Peter Lloyd, of Dunstable, offered the shortest solution to the program that prints a copy of itself:

```
10 READ A$: PRINT "10 ";A$: PRINT"20
DATA "; A$
20 DATA READ A$:PRINT "10 ";A$: PRINT
"20 DATA ";A$
```

*But Dr Lloyd also pointed out that any BBC Micro program can be made to print a copy of itself using the *FX138 command to put characters into the keyboard buffer.*

This universal trick was better explained by Sgt. Brian Driver, of RAF Akrotiri, thus: "The secret is to know which character to inject. CHR$(128) serves well as OLD and, armed with this knowledge, it soon became obvious that the inclusion of L. (for LIST) and a couple of 13s (Return) should do the trick. So if you have a program that can get to an END statement delete the END and replace it with:

```
*FX15,0            (Clear Buffers)
*FX138,0,128       (OLD)
*FX138,0,13        (RETURN)
*FX138,0,76        (L)
*FX138,0,46        (.)
*FX138,0,13        (RETURN)
```

*"Each *FX call must be on a separate line and ignore the bits in brackets – they just explain what each call does!"*

There were other equally valid entries, but brevity is a virtue. the shortest answers are the above and the prize goes to Peter Lloyd for suggesting two methods.

PUZZLE

SINCE so many of you responded to Derlien's puzzle here is another one. As before, you have to be able to read and understand what the program wants in order to make it stop.

It took me two hours to solve but I did recognise the puzzle, appreciate the hints and am familiar with Reverse Polish Notation. The puzzle could well be set in the final exam for a BSc. in computer science.

Note that the prize will go to the shortest rather than the quickest answer and, in the event of a tie, a random choice will be made.

This is my last article reviewing adventures. From now on I shall try to present and explain a far wider range of problems which will hopefully illustrate simple but useful computer theory in an entertaining way.

```
10CLS:DIM SS(129),WW(12)
20PRINT'"This is the start."
30C=0
40C=C+1
50PRINT"What'll you give me for ";
C;:INPUT" ",S$
60L=LEN(S$)
70IF L>12 THEN PRINT"Brevity is a
virtue":GOTO20
80IF L<1 THEN GOTO 50
90OK=1:K=0
100FOR J=1 TO L
110CH$=MID$(S$,J,1):N=ASC(CH$)
120IFN<>52 AND INSTR("DREAMS",CH$)=
0 THEN OK=0:J=L
130IF N=52 THEN WW(J)=N-48:K=K+1:EL
SE WW(J)=N-ABS(N>90)*32
140NEXT J
150IF OK=0 THEN PRINT"I spy forbidd
en symbols":GOTO 20
160IF K<>4 THEN PRINT "Not the corr
ect number of numbers":GOTO20
170P=0:J=1
180N=WW(J)
190IF N=K THEN P=P+1:SS(P)=N:GOTO 2
90
200IF N=82 THEN SS(P)=SQR(SS(P)):GO
TO290
210P=P-1:IF P<1 THEN PRINT "Stacks
more work to do":GOTO20
220A=SS(P):B=SS(P+1)
230IFB=0 AND N=68 THEN PRINT"You ge
t nothing for that":GOTO 20
240IF N=65 THEN SS(P)=A+B
250IF N=68 THEN SS(P)=A/B
260IF N=69 THEN SS(P)=A^B
270IF N=77 THEN SS(P)=A*B
280IF N=83 THEN SS(P)=A-B
290J=J+1
300IF J<=L THEN GOTO 180
310IF P<>1 OR SS(P)<>C THEN PRINT"N
ot a satisfactory result":GOTO 20
320IFC<>10 THEN GOTO 40
330PRINT"That counts as a correct a
nswer."
```

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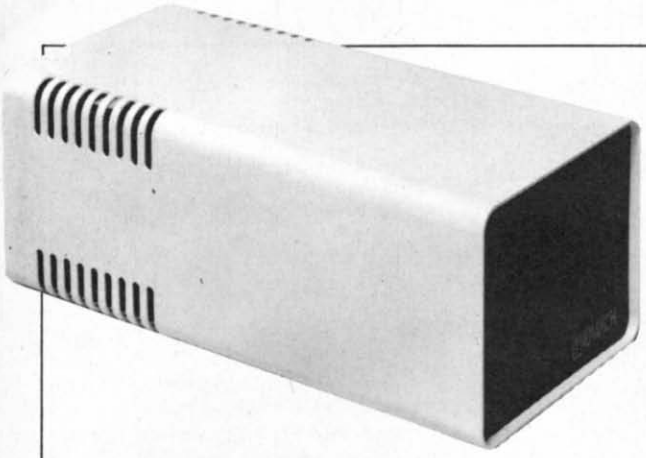

Is this the year of the hard disc?

JIM NOTMAN reviews the 5.2 megabyte Midwich Winchester disc drive

IT doesn't take long after upgrading from a cassette system to floppy discs to appreciate the increased speed and flexibility you obtain.

Moving further up to hard discs will prove to be just as exciting, with their superior speed and huge storage capacity.

Hard discs are finely engineered aluminium discs coated with magnetic medium, spinning at the high speed of 3600 rpm. (Floppies only spin at 300 rpm). The "head" that does the reading from and writing to the disc does not touch the magnetic surface, but floats over it at a distance of only 10 microns – much less than the thickness of a human hair.

To prevent damage from dust or other small particles these hard discs are fixed into the drive and are totally enclosed in their own bubble of clean air. This type of hard disc drive is also referred to as a Winchester disc, to distinguish it from the large, expensive, hard disc drives found on mainframe computers, where the discs may be removed.

With all hard discs it is important not to subject the drive to any knocks while it is running. If the head does touch the surface a disc crash results, destroying the magnetic coating.

Product: Winchester drive
Price: £346 (5 megabyte), £1,057 (20 megabyte)
Supplier: Midwich Thame, Gilray Road, Diss, Norfolk IP22 3EU. Tel: 0379 4131

The Midwich system features the command *PARK which moves the read/write head off the data area. This should be typed in before switching off the drive and always before moving the drives.

With a floppy disc unit up to 80 tracks of information can be placed on the disc. A hard disc may write 600 tracks in a similar amount of space. There are also more sectors on each track. This leads to one of the biggest advantages of hard discs – a large capacity in a relatively small space.

The other main advantage is the speed of access and data transfer. With discs that spin constantly and quickly data can be accessed more speedily than with a floppy, where there is often a wait for the disc to come up to speed.

The speed improvement is reflected in the benchmarks (see Table I). With floppies the Midwich Filing System (MWFS) is about the same speed as an Acorn DFS, but the hard disc is much faster. The biggest improvements are with relative access files, the type commonly used with databases.

The main disadvantage is cost, though this has now dropped significantly. A 5 megabyte hard disc now costs about the same as a double sided, dual, 80 track floppy drive did two years ago.

The version reviewed has 5.2 mbytes of storage capacity, equivalent to 26×80 track single sided floppies. It is housed in a cream coloured metal case standing 5¼in high, just over 6¾in wide and 12¾in deep.

The front has a black plastic panel with a red activity light visible. On the back panel there is only one control, a mains power switch. About one metre of ribbon cable connects the unit to the 1 MHz bus of the BBC Micro.

After switching on the disc drive starts to spin, sounding like a distant aircraft taking off as the cooling fan comes on and the discs accelerate up to full speed. Unlike floppy disc drives, hard discs continue to spin all the time they are switched on. In a quiet environment this noise seems intrusive at first, but you soon get used to it.

The controlling MWFS software is supplied on a 16k eprom for insertion into a paged ROM socket. The same chip can control both a hard disc and a standard 8271 single density floppy disc interface. With floppy discs the MWFS is for the most part Acorn compatible.

There are different manuals for the floppy and hard disc systems. In general

TEST	Acorn 0.90	Acorn 1.20	Midwich 0.60 Floppy	Midwich 0.60 Hard
1 OPEN + CLOSE files*1000	4.3	5.1	5.6	12.6
2a PRINT 1000 numbers	15.7	6.7	9.3	4.6
2b PRINT 100 strings	61.0	24.8	24.8	17.7
3a INPUT 1000 numbers	12.6	5.8	5.6	3.9
3b INPUT 100 strings	57.1	23.0	23.7	14.1
4 BPUT 1000 bytes	5.0	3.4	3.6	2.1
5 BGET 1000 bytes	3.9	2.5	2.6	1.7
6 move PTR 1000 places	2.2	2.2	2.5	1.6
7a Write test relative file	62.9	25.9	25.9	18.4
7b Read test relative file	58.4	23.5	24.1	14.5
8a Write relative file backwards	240.3	99.6	97.3	41.7
8b Read relative file backwards	99.9	39.2	40.5	16.8

Table I: DFS Benchmark Table

these are good, but the hard disc manual lacks any information on writing directly to the Winchester.

Figures I to V show the responses to *HELP. There is no in-built disc format or verify command, so these are supplied on a utility disc. Another utility program supplied is TWINCAT, which allows two catalogues on a disc, though only one may be active at a time. The catalogues can be swapped at any time with the command *SC.

The disc storage is arranged in a simple way. Rather than treating it as one large area it is divided into volumes and these act as if they are separate and independent disc drives, each equivalent to one side of an 80 track floppy disc.

This makes it easy to transfer data between the floppy and hard disc systems, simply by using *BACKUP or *COPY. With the 5 mbyte version these volumes are numbered from 4 to 28. The main disadvantage with this approach is that maximum size of a file is limited to the size of a volume.

Life becomes more complicated because there are different types of system – for instance, standard DFS, Econet and CP/M – which require different types of catalogue. Any volume can be given one of these formats with the *ALLOCATE command.

This is seen when *HELP VOLUMES is typed in as shown in Figure V, where MWFS refers to the standard Acorn format and *spare* shows that it has not yet been allocated. The title of each drive is also displayed.

With CP/M two adjacent volumes are treated as one. With Econet more volumes can be treated together, so that with a level 2 file server upto 2.4 mbytes can be treated as one and with level 3 the whole disc if you want.

As with floppy drives any volume can be selected to be the current drive with the command *DRIVE. To allow compatibility with existing software any of the hard disc drives can be given a drive number in the range 0 to 3 with *ASSIGN. These assignments are written onto the disc so that they will remain in force until rewritten.

Another option, *BOOT, selects the volume to be searched for a !BOOT file, when the Shift and Break keys are pressed. There's also a command to prevent a volume being accidentally overwritten, *PROTECT, which works rather like *ACCESS, but works on the whole volume rather than a file at a time.

Most of the rest of the commands work just as you'd expect with a DFS.

```
MWFS 0.60
  DFS
  FILES
  UTILS
  VOLUME
```

*Figure I: *HELP*

```
MWFS 0.60
  ACCESS <afsp>
  ALLOCATE <drive> <M/N/C/S>
  ASSIGN <drive 0/2> <drive>
  BACKUP <source> <dest.>
  BOOT <drive>
  CLOSE
  COMPACT (<drive>)
  COPY <source> <dest.> <afsp>
  DELETE <fsp>
  DESTROY <afsp>
  DIR (<dir>)
  DRIVE <drive>
  ENABLE
  INFO (<afsp>)
  LIB (<dir>)
  PARK
  PROTECT (<drive>) (P)
  REMOVE <fsp>
  RENAME <old fsp> <new fsp>
  TITLE
  WIPE <afsp>
```

*Figure II: *HELP DFS*

```
Channel 17 - :14.$.data     R/W
             PTR=0001C07 EXT=0002BA2
Channel 18 - Not open
Channel 19 - Not open
Channel 20 - Not open
Channel 21 - Not open
```

*Figure III: *HELP FILES*

```
MWFS 0.60
  BUILD <fsp>
  DISC
  DUMP <fsp>
  LIST <fsp>
  TYPE <fsp>
```

*Figure IV: *HELP UTILS*

The differences include *REMOVE, which is very similar to *DELETE, but does not produce an error message if the file is not found.

*HELP FILES (Figure III), is similar to a command found on the Watford DFS. It displays any open files, with the filename, whether it is a read and/or write file, the length of the file, EXT#, and where the pointer is (PTR#).

An extra bonus is that error messages are a little more friendly than with the Acorn DFS. For example instead of Bad command there is now Command not recognised.

In addition, the MWFS software has tube software necessary for driving second processors in it. There is no need to have the Acorn DNFS fitted unless you want access to the network filing system.

The set of Winchester utilities supplied includes a formatter if the whole disc needs to be reformatted, tests to write to and read from the disc and a facility to patch the Econet file server for use with the hard disc.

As with most things we review there was the occasional problem. If the Escape key was pressed when displaying a file with *DUMP, the file was sometimes left open. However, this could be closed with *CLOSE.

Another problem is that it may be difficult to transfer some disc packages from floppy disc if they employ any form of software protection, though this will be true of any hard disc system, even Acorn's.

The Midwich system is a cheaper alternative to Acorn's Winchesters. The large amount of fast storage on line will improve any BBC Micro system, from software development using compilers to running databases. Such is the improvement that these days I would not consider running an Econet sytstem without a hard disc.

An ADFS compatible version is also available. This allows for longer files, necessary for running large databases.

We have recently had the year of the floppy disc and year of the modem. Could this be the year of the hard disc?

```
*!BOOT* drive :4

 0,1    14   Reviews      /blank volume
 2,3    12   QUESTD       /blank volume

 4,5   MWFS  Utilities    /blank volume
 6,7   MWFS  Arcade Games/blank volume
 8,9   MWFS  Board Games /blank volume
10,11  spare
12,13  MWFS  QUESTD       /blank volume
14,15  MWFS  Reviews      /blank volume
16,17  CP/M  drive C
18,19  spare
20,21  NET   drive 1 NETWORK
22,23  spare
24,25  MWFS  ViewStore    /Store Data
26,27  MWFS  blank volume/blank volume
28,29  MWFS  blank volume/blank volume
30,31  MWFS  floppy drives 0,1
32,33  MWFS  floppy drives 2,3
```

*Figure V: *HELP VOLUMES*

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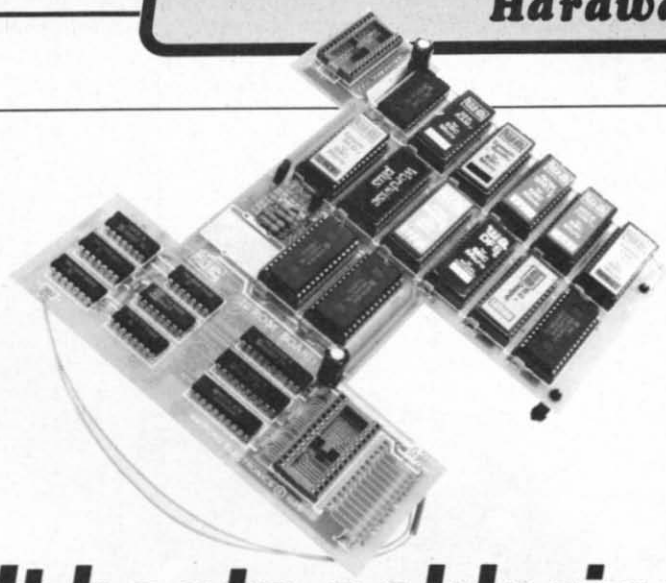

Product: Solderless ROM/RAM Board with battery backup
Price: £36
Supplier: Watford Electronics, 250 Lower High Street, Watford. Tel: 0523 37774.

It beats soldering any day..

KEVIN EDWARDS gives the thumbs up to a solderless ROM board

IT was back in the good old days that Watford Electronics announced the first ROM extension board for the BBC Micro. Since then such boards have appeared from numerous companies in various forms.

Watford's latest product – for the Model B only – is of the solderless variety, which means that there aren't any messy wires to solder to the main circuit board, as was the case with their earlier product.

To many novice users the idea of removing the lid from their micro is enough to make them cringe, never mind cutting tracks and soldering wires to various components. This has been acknowledged by several companies and solderless ROM boards have appeared in place of the previous dinosaurs.

At the moment the operating system can support up to 16 sideways ROMs. Each, when selected, lives in the 16k memory area between &8000 and &BFFF. Thus the ROMs and eproms accepted by the ROM boards are up to 16k in length. If an 8k ROM is used instead it appears twice – from &8000 to &9FFF and &A000 to &BFFF.

The standard BBC Micro has space for four ROMs – one of which is used for Basic. Thus three are left available for additional ROMs such as word processors, spreadsheets, disc filing systems, databases, languages and so on.

After almost no time the spaces are filled and it's time to look around for a ROM board which adds another 12 ROM sockets to the existing four to give the maximum capacity.

Most of the ROM boards available have sideways RAM options. Basically sideways RAM acts like a ROM but has the obvious advantage that different ROM programs can be loaded into the RAM from disc when required.

Therefore, in addition to the ROMs fitted on the board, hundreds of ROMs can be used by simply loading them from disc when required – but only one can be used at a time since there is only one sideways RAM bank.

Even this shortcoming has been overcome because Watford also produce a ROM/RAM board which can have eight banks of sideways RAM. However, for the fully blown version of this you will pay three times the price of the solderless ROM board – and worth every penny in my opinion.

This review is based on the solderless ROM board, supplied with 16k of sideways RAM in the form of two 8k RAMs (6264) and battery backup. The battery allows the contents of the sideways RAM to be retained when the micro is turned off – a useful feature.

Fitting the board was interesting to say the least. Firstly the operating system ROM (IC 51) and ADC ROM (IC 73) must be removed from their sockets and placed on the ROM board, because the board uses these two sockets to support itself.

Next the link connecting S21 must be removed and a fly lead from the ROM board is slotted on to the link pins.

So far so good. Now the board is gently lowered into place over the central area of the main circuit board. Before this can be done one of the micro's power connectors – which clips onto the main circuit board – must be bent over to allow the ROM board to make contact with the two vacated sockets.

This should be done carefully as the contacts for the power wires are not always securely fastened. Once this had been done I encountered another small problem.

Beneath the right edge of the ROM board are two plastic legs which help hold the board firmly in place. However I found that the rear leg was right over a raised resistor on the main circuit board. This meant the board couldn't be slotted in place because the right edge was raised too high, as this was the case with two other BBC Micros into which I tried to fit the board.

The solution was simple – remove the offending legs. Since they were just slotted into two holes on the ROM board this didn't present a problem. Finally the board was pushed home and all was well.

The exact details for fitting are given on an A4 sheet supplied with the board. Unfortunately minor problems with the power leads and legs are not mentioned.

The next task is to populate the board with ROMs. This is not just a case of putting them in any available socket, but involves a bit of thought. The 16 sockets are numbered 0 to 15, where 15 has the highest priority and 0 the lowest – sockets 0 to 3 are the original ROM sockets on the main board.

When the BBC Micro is turned on the first ROM found with a language entry

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point, such as View, Basic or Pascal, will be selected. Since the search begins with socket 15 the ROM you wish to power up in must be the first one encountered, so a ROM in socket 13 will be encountered before one in socket 12.

In most cases the power up language is Basic, in which case the Basic ROM must be moved from its position on the main circuit board to socket 15 to ensure it is encountered first – so get your priority right.

Socket 14 is split across two sockets, 14L and 14H, which can be configured to accept different combinations of ROM and RAM. The configuration is defined by link connections on the board.

This, for example, means that two 8k devices can be combined to act as if they are a single 16k device. Other RAMs and eproms accepted by socket 14L/14H are the 6116, 2716, 2732 and 27128 varieties.

As supplied, the two sockets can contain 8k ROMs/eproms (2764), 8k RAMs (6264) or a combination of the two. My board contained two 8k RAMs, the maximum RAM configuration.

ROM software being developed or transferred from original copies of the ROMs can be loaded into the sideways RAM bank by simply *LOADing it to 8000. When any data is written to the region &8000 to &BFFF it is automatically sent to socket 14.

The sideways RAM can be read and write protected. Read protecting may seem a useless feature, but when you are using a battery backup it's very important. For instance, if a ROM program is under development and it fails and crashes completely the micro will be permanently crashed, even when powered up again.

This is because the battery retains the code responsible for crashing it. However you can make the sideways RAM disappear to all read operations by removing a link connector on the ROM board.

The write protect link allows the sideways RAM to be protected from write operations. Once initialised it effectively turns the RAM into ROM since it cannot be altered.

Another important feature of the solderless ROM board is that it is not positioned too closely to IC78 where the disc controller resides. This is because double density disc filing systems use a small carrier board to house their disc controller and associated circuitry.

If this board is large there is a chance that it will clash with the position of the ROM board. There seems to be ample room for most of the double density controller board, but it is well worth checking before you buy.

During the review the solderless ROM board performed faultlessly. My only niggles were with regard to fitting it, but it was certainly easier than soldering wires.

The board has been well laid out and its position is much better than others – not over the hot RAM chips and further away from the disc controller area.

I give the solderless ROM board the thumbs up and wish it success.

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Wordease lives up to its name

IAN WHITMORE examines a logical extension to Wordwise-Plus

Product: Wordease
Price: £29 (ROM £21 (disc)
Supplier: Beebugsoft, PO Box 109, High Wycombe, Bucks HP10 8NP. Tel: 0727 40303

IN addition to being a versatile word processor Wordwise-Plus also supports its own programming language, albeit one oriented towards word processing.

Several articles have appeared which suggest ways of using this language to improve usage of Wordwise-Plus by writing programs in the segments. Wordease takes this idea one stop further by placing a menu program in segment 9 and loading individual utility programs into segment 8.

It is supplied on two 8k eproms and all that is needed is to press Shift+R then Break with the Wordwise-Plus chip in the BBC Micro.

Thirteen utilities or groups of utilities are accessed from the menu (see Figure I) and fall into three main categories providing extra facilities for word processing, programming or both.

Utility A, auto-version save, allows the text area to be saved to disc at will with incrementing filenames such as File1, File2, File3 and so on. Unlike other examples this auto-save facility is not timed and requires segment 8 to be called each time a save is required. Unfortunately it always returns you to the text with the cursor at the top after saving.

The Gen Utils G are really three options packaged together. The first strips all the embedded commands from the text or a designated segment. Like the SPOOL option in Wordwise-Plus, this command leaves the text as a stream of Ascii characters with only the default settings for formatting.

The second option is concerned with documents that contain section numbers, enabling you to renumber the sections as long as the numbers are at the beginning of a line and also renumber the references to the sections in the text.

The renumbering can be selective or global and can be applied to a marked part of the text only. The numbers can contain full stops but no other non-numeric character is allowed.

The third component of this utility can align numbers in a column, right justifying the column or aligning the column around full stops.

Hardcopy printer codes (see Figure II) are available as option H. Epson codes are provided, but they can be changed by editing the program and resaving it.

```
WORDEASE
(C) Beebugsoft 1985        Free:
                           11878
A. Auto-Version Save       $ 587
B. Basic Status
C. Copy Segment to Segment
D. Disc Menu
E. Edit Text/Segment
F. Function Key Editor
G. Gen Utils (Strip/Renumber/Align)
H. Hardcopy Codes
I. Individual Symbols
J. Standard Page Handler
K. Program Utils (Analyse/Compact)
L. Label Printer
M. Mail Merge

  T   EXIT to Text        Text= WRDEAS9
A-9   EXIT to Segment     Seg8= K
  R   Run  Segment
  W   Wipe Seg/Text
  @   Change Drives       Util=A Other=2

Select Option
```

Figure I: Main menu

```
EPSON PRINTING CODES

        Target Area: text

ON OFF   FEATURE

A   B    Underlining
C   D    Double-strike
E   F    Enlarged
G   H    Elite     (OFF=Pica)
IJ  K    Emphasised,Condensed
L   M    Italic
NP  O    Subscript,Superscript
R   S    American (OFF=English)

A 7,or T  Change  Target
        X  Exit to Target
        M  Exit to Main Menu

Select a letter to enter  printer
code into text at cursor position

Select Option
```

Figure II: Option H, hardcopy printer codes

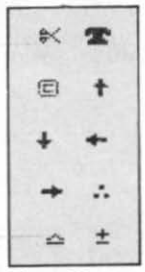

Figure III: Special symbols

Item I allows individual symbols such as scissors, telephone, various arrows, plus and minus, approximately, therefore and copyright (Figure III) to be inserted into the text as embedded commands for printing on an Epson-compatible printer using the single density graphic mode.

Option J from the Wordease menu searches the utility and text discs for files in directory T and offers them for loading into text or segments. Loading can overwrite or be to cursor. This facility can be used to save standard

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formats such as groups of embedded commands for differing page layouts and letterheads.

The label printer, L enables you to print a file of address data onto labels. Printer options are chosen from a menu – defaults are for Epson and two columns of labels – and a test facility allows the first few labels to be printed to demonstrate the formatting.

Mail merging is supported by option M, using a standard letter created with the aid of this option and an address file in the same form as that for the label printer. Screen preview of the assembled letters is recommended to check the layout.

Options B and D detail the contents of the text area and segments, and the text disc respectively, displaying the first 25 characters of the file. From disc the display appears in different colours if it starts with a REM, green, or some other character. Loading any file to the target area is by single keypress.

Option C allows you to copy text or programs from segment to segment, either overwriting or to cursor.

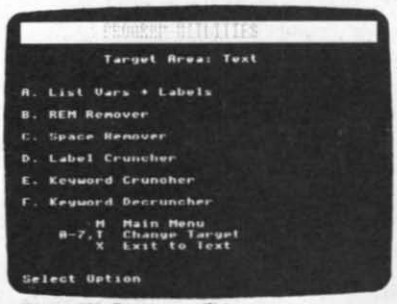

Figure IV: Program utilities

Additional editing facilities, E, have been designed to allow errors in text or program to be easily located and corrected. Function key editor F eases the use of these keys in Wordwise-Plus.

The final selection, K, available from the main menu, is cryptically called Program Utils (Analyse/Compact). The subsidiary menu, Figure IV, details the six available programming utilities. Four of these acknowledge the small memory in the standard BBC Micro by shortening programs, removing REMs and spaces and shortening labels and keywords to their minimum abbreviations. Keywords can be re-expanded to make programs more readable. It is also possible to list all variables and labels in a segment program with hardcopy option.

Wordease is also available on disc. It is 6502 second processor compatible, although you need to load it from within HiWordwise-Plus or write a different boot file in order to load HiWordwise-Plus first.

Wordease behaves like an extension of Wordwise-Plus, making it particularly easy for the inexperienced user. The manual is clearly printed and provides comprehensive explanations of the utilities, adding technical information in places to enable you to modify the programs where you wish.

Lastly, although appearing to compete with Watford's Word-Aid, the program uses different segments and only half the routines are common to both. You may wish to use both, but I have not been able to see what happens when both are loaded together.

● **Verdict: Beebugsoft has produced a good package at a very reasonable price.**

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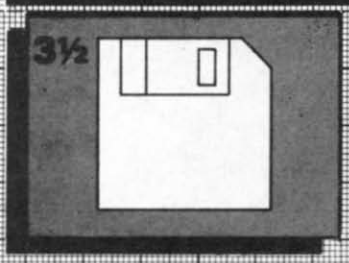

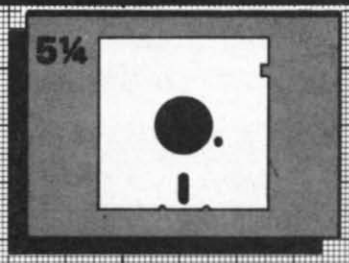

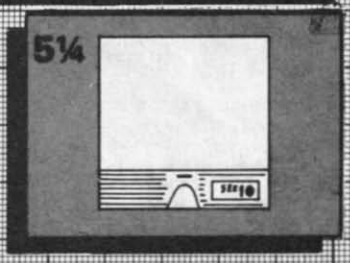

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```
  240 MODE7:VDU23;8202;0;0;0;:CLOSE00
  250 X%=0:Y%=&FF:A%=&EA:TUBE%=USR(&F
FF4) AND &FF00:IF TUBE%=0 AND !&900<>
&A204A0 PROCinitasscode
  260 *FX4,1
  270 *FX11,15
  280 *FX12,15
  290 DIMCLI% 50,OSWORD% 5
  300 DIMCAT$(61),T$(128),NW%(61):CLS
:DN%=0:SC%=32066:RESTORE1920:FORZ%=1T
O128:READT$(Z%):NEXT:LGL%=0
  310 PC%=0:PRINT''CHR$148STRING$(39,
CHR$96);:EF6%=0:GOTO380
  320 VDU31,0,3:IFEF6%=2 PRINTCHR$131
"*"CHR$135"*RUN"SPC2CHR$131"I"CHR$135
"INFO"SPC4CHR$131"T"CHR$135"TITLE"SPC
1CHR$131"A"CHR$135"LOCK ALL"CHR$131"E
"CHR$135"MERGE"SPC1CHR$131"H"CHR$135"
HELP"SPC4CHR$131"M"CHR$135"DUMP"SPC2;
  330 IFEF6%=2 PRINTCHR$131"O"CHR$135
"COMPACT"SPC1CHR$131"1"CHR$135"Menu 1
"CHR$131"N"CHR$135"DRIVE"SPC3CHR$131"
ESC"CHR$135"Catalogue  disk"CHR$148ST
RING$(39,CHR$112);:GOTO440
  340 IFEF6%=3 GOTO380
  350 PRINTCHR$133SPC2"Use the arrow
keys to select a file"SPC2CHR$131SPC8
"YELLOW files are locked"SPC8CHR$136S
PC13"Press <SPACE>"SPC13;
  360 REPEATUNTILINKEY(-99)=0:REPEATU
NTILINKEY(-99):REPEATUNTILINKEY(-99)=
0:VDU31,0,3:*FX15,0
  370 EF6%=HIJ%:GOTO320
  380 PRINTCHR$131"L"CHR$135"LOAD"SPC
2CHR$131"C"CHR$135"CHAIN"SPC3CHR$131"
F"CHR$135"Formatted listing"CHR$131"K
"CHR$135"LOCK"SPC2CHR$131"U"CHR$135"U
NLOCK"SPC2CHR$131"P"CHR$135"List  PRO
Cs & FNs";
  390 PRINTCHR$131"2"CHR$135"Menu 2"C
HR$131"D"CHR$135"DELETE"SPC2CHR$131"E
SC"CHR$135"Catalogue  disk"CHR$148STR
ING$(39,CHR$112);
  400 IFEF6%=3 GOTO440
  410 IFEF6%=1 EF6%=0:GOTO460 ELSE IF
EF6%=0 PROCcat:EF6%=3
  420 D1%=SC%+PC%:PROCosword(D1%,5):D
2%=?(OSWORD%+4)
  430 ?(OSWORD%+4)=132:PROCosword(SC%
+PC%,6)
  440 *FX15,1
  450 ON ERROR RUN
  460 PROCget:IF6$>CHR$96 AND G$<CHR$
123 G$=CHR$(ASCG$-32)
  470 IFG$="H" PROCsave:PROChelp:PROC
restore:GOTO440
  480 IFG$="L"ORG$="C" PROCfx:GOTO580
  490 IFG$="1" EF6%=3:GOTO320
  500 IFG$="2" EF6%=2:GOTO320
  510 IFG$="T" PROCtitledisc:RUN
  520 IFG$="A" PROClockall:RUN
  530 IFG$="*" PROCfx:MODE7:PROCstarr
un
  540 IFG$="I" PROCsave:PROCinfo:PROC
restore:GOTO440
  550 IFG$="E" PROCmerge:RUN
  560 IFG$="M" PROCsave:PROCdump:PROC
restore:GOTO440
  570 IFG$="O" PROCcompact
  580 IFG$="L" MODE7:PROCload:END
  590 IFG$="C" PROCchain:END
  600 IFG$="D" PROCsave:PROCdelete:PR
OCrestore:GOTO440
  610 IFG$="K" D2%=131:PROCsave:PROCl
ck:PROCrestore:GOTO440
  620 IFG$="U" D2%=135:PROCsave:PROCu
nlock:PROCrestore:GOTO440
  630 IFG$="N" PROCsave:PROCdrive:CLS
:GOTO310
  640 IFG$="F" PROCsave:MODE7:VDU23;8
202;0;0;0;:PROCformlist:MODE7:PROCres
tore:GOTO440
  650 IFG$="P" PROCsave:PROCprocs:PRO
Crestore:GOTO440
  660 IFG$=CHR$136 PC%=PC%-10:IFPC%<0
 PC%=LC%+10-10
  670 IFG$=CHR$137 PC%=PC%+10:IFPC%=1
0*LC% PC%=0
  680 IFG$=CHR$138 PC%=PC%+40:IFPC%>=
10*LC% PC%=(PC%/10)MOD4*10
  690 IFG$<CHR$136ORG$>CHR$139 HIJ%=E
F6%:EF6%=1:GOTO320
  700 IFG$=CHR$139 PC%=PC%-40:IFPC%<0
 PC%=PC%+((LC%-LC%MOD4)*40DIV4)+40*-(
(LC%MOD4)>0):IF(PC%*4)>((LC%-1)*40) P
C%=PC%-40
  710 ?(OSWORD%+4)=D2%:PROCosword(D1%
,6):GOTO420
  720 DEFPROCcat:PS%=0:NN%=0:NF%=0:PR
INTTAB(0,11)"";
  730 ONERROR GOTO1580
  740 LC%=0:?&80=DN%:PROCloadsect  ,
  750 IF!&7900=&AAAAAAAA AND !&7904=&
AAAAAAAA NN%=1 ELSE NN%=0
  760 N1%=0
  770 PROCtitle:PRINTTAB(0,0)"";
  780 FORD1%=0TO30:IFPS%=INT((?&7805)
/8+NN%*(?&7A05/8)) GOTO800 ELSE C1%=D
1%+31*N1%:IF ?(N1%*&100+&7706+C1%*7+C
1%+&100)=70 GOTO800 ELSE T$="":CX%=N1
%*&100+&7706+C1%*7+C1%:FORC2%=2TO8:CY
%=?(CX%+C2%)
  790 T$=T$+CHR$(CY% OR 128-128):NEXT
:VDU129,?(CX%+C2%):PROClock:CAT$(PS%)
=T$:NW%(PS%)=CX%+C2%:PRINTT$;:PS%=PS%
+1
  800 NEXT:IFNN%=1 AND N1%=0 N1%=1:GO
TO780 ELSE LC%=INT((?&7805+1)/8+NN%*(
?&7A05/8)):ENDPROC
  810 DEFPROClock:IF?(CX%+C2%)AND128
PRINTCHR$131; ELSE PRINTCHR$135;
  820 ENDPROC
  830 DEFPROCload:PROCss:PRINTTAB(8,1
0)CHR$141CHR$132"LOADING"CHR$131S$:PR
INTTAB(8,11)CHR$141CHR$132"LOADING"CH
R$131S$''':L$="LOAD "+CHR$34+S$+CHR$3
4+CHR$13:FORT%=1TO8+LENS$:Y%=ASC(MID$
(L$,T%,1)):A%=138:X%=0:CALL&FFF4:NEXT
:END
  840 DEFPROCstarrun:PROCss:PRINTTAB(
8,10)CHR$141CHR$132"*RUNNING"CHR$131S
$:PRINTTAB(8,11)CHR$141CHR$132"*RUNNI
NG"CHR$131S$''':L$="*RUN "+CHR$34+S$+
CHR$34+CHR$13:FORT%=1TO8+LENS$:Y%=ASC
(MID$(L$,T%,1)):A%=138:X%=0:CALL&FFF4
:NEXT:END
  850 DEFPROCcompact:CLS:PRINTTAB(8,1
0)CHR$141CHR$132"COMPACTING DISC"TAB(
8,11)CHR$141CHR$132"COMPACTING DISC"C
HR$131''':*FX3,2
  860 L$="*COM. "+CHR$13+"CH.""CATALO
G"""+CHR$13:FORT%=1TOLENL$:Y%=ASC(MID
$(L$,T%,1)):A%=138:X%=0:CALL&FFF4:NEX
T:END
  870 DEFPROCinfo:CLS:VDU31,12,6:PRIN
TCHR$129CHR$141"INFORMATION"'SPC12CHR
$129CHR$141"INFORMATION"''CHR$131"Dir
' File L/U Start  Exec'  Len' Sect'"
  880 VDU31,0,10,141,31,0,11,141,28,1
,24,39,0:VDU31,0,10:PROCss:$CLI%="*IN
. "+S$:X%=CLI% MOD256:Y%=CLI% DIV256:
CALL&FFF7:CALL&FFF7:VDU26,31,12,16,13
2,141:PRINT"PRESS SPACE"'SPC12CHR$132
CHR$141"PRESS SPACE":REPEATUNTILGET=3
2:ENDPROC
  890 DEFPROCdump:ON ERROR VDU26:CLOS
E00:PROCrestore:GOTO440
  900 CLS:FORXX%=0TO24:VDU31,0,XX%,13
0:NEXT:VDU28,1,24,39,0:VDU30:PROCss:P
RINTSPC6CHR$141"DUMP of file: "S$'SPC
6CHR$141"DUMP of file: "S$''':VDU14:$C
LI%="*DUMP "+S$:X%=CLI% MOD256:Y%=CLI
% DIV256:CALL&FFF7
  910 VDU15:PRINT'SPC11CHR$141CHR$133
"PRESS SPACE"'SPC11CHR$141CHR$133"PRE
SS SPACE";:REPEATUNTILGET=32:VDU26:EN
DPROC
  920 ENDPROC
  930 DEFPROCchain:CLS:PROCss:PRINTTA
```

```
B(8,10)CHR$141CHR$132"CHAINING"CHR$13
1S$:PRINTTAB(8,11)CHR$141CHR$132"CHAI
NING"CHR$131S$:CHAIN S$
  940 DEFPROCss:S$=CHR$((?(NW%(PC%/10
))OR128)-128)
  950 IFASCS$=0 S$="" ELSE S$=S$+"."
  960 S$=S$+CAT$(PC%/10):ENDPROC
  970 DEFPROCunlock:CLS:PROCss:PRINTT
AB(7,10)CHR$141CHR$132"UNLOCKING "CHR
$131S$:PRINTTAB(7,11)CHR$141CHR$132"U
NLOCKING "CHR$131S$:$CLI%="*AC. "+S$:
X%=CLI% MOD256:Y%=CLI% DIV256:CALL&FF
F7:ENDPROC
  980 DEFPROClck:CLS:PROCss:PRINTTAB(
8,10)CHR$141CHR$132"LOCKING "CHR$131S
$:PRINTTAB(8,11)CHR$141CHR$132"LOCKIN
G "CHR$131S$:$CLI%="*AC. "+S$+" L":X%
=CLI% MOD256:Y%=CLI% DIV256:CALL&FFF7
:ENDPROC
  990 DEFPROCdrive:CLS:ONERROR GOTO10
90
 1000 PRINTTAB(10,10)CHR$141CHR$132"C
HANGE DRIVE":PRINTTAB(10,11)CHR$141CH
R$132"CHANGE DRIVE"''SPC9CHR$141CHR$1
30"Which drive?"'SPC9CHR$141CHR$130"W
hich drive?":REPEATDN%=GET-48:UNTILDN
%>=0 AND DN%<4
 1010 VDU31,24,13:PRINT;DN%:VDU31,24,
14:PRINT;DN%:$CLI%="*DR. "+STR$(DN%):
X%=CLI% MOD256:Y%=CLI% DIV256:CALL&FF
F7:*FX3,2
 1020 *.
 1030 *FX3,0
 1040 ENDPROC
 1050 DEFPROCdelete:CLS:PROCss:PRINTT
AB(8,10)CHR$141CHR$132"DELETE"CHR$131
S$:PRINTTAB(8,11)CHR$141CHR$132"DELET
E"CHR$131S$
 1060 PRINTTAB(10,13)CHR$141"ARE YOU
SURE? ":PRINTTAB(10,14)CHR$141"ARE YO
U SURE? ":G=GET:IFG<>ASC"Y"ANDG<>ASC"
y" ENDPROC
 1070 ONERRORVDU7:GOTO1120
 1080 CLS:PRINTTAB(8,10)CHR$141CHR$13
2"DELETING"CHR$131S$:PRINTTAB(8,11)CH
R$141CHR$132"DELETING"CHR$131S$:$CLI%
="*DEL. "+S$:X%=CLI% MOD256:Y%=CLI% D
IV256:CALL&FFF7:RUN
 1090 *FX3,0
 1100 VDU7
 1110 CLS:PRINTTAB(5,10)CHR$141CHR$13
2"DRIVE ";DN%CHR$131"is NOT CONNECTED
!":PRINTTAB(5,11)CHR$141CHR$132"DRIVE
 ";DN%CHR$131"is NOT CONNECTED!":FORX
=1TO2000:NEXT:GOTO1130
```

PROCEDURES

starrun	*RUNs a machine code program.
compact	Compacts disc in current drive.
info	Displays information on a file.
dump	Dumps a file to screen in hex and Ascii.
initasscode	Assembles the code which saves and recalls Mode 7 screens.
help	Shows the help page.
merge	Merges two Basic programs together to form a third.
lockall	Locks all files on the current disc.
titledisc	Enables the user to alter the disc title.
cat	Switches off output to the screen, then catalogues the disc in the currently selected drive. The micro then calls PROCloadsect which loads the catalogue from disc and puts it in memory at &7700. The filenames stored there are then read by PROCcat and printed across the screen four at a time preceded by their directory typed in red and the filename itself in white – or yellow if locked.
title	Reads the disc's title (if any) and the number of files on disc from the data already loaded into memory, and displays them at the top of the screen, along with the current drive number.
get	Waits for input from either the keyboard or the paddle buttons.
adval	Is called by PROCget. When pressed, paddle button zero selects between files, and button one CHAINs in the selected file.
lock	Is called by PROCcat and checks to see whether or not a file is locked and, if so, prints it in yellow. Otherwise the file is printed in white.
load	LOADs a selected file.
chain	CHAINs a selected file.
lck	Locks a selected file.
unlock	Unlocks a selected file.
delete	DELETEs a selected file, but first asks if you are sure.
drive	Selects drive.
ss	Is used by the file-handling procedures to discover the directory type of a file.
fx	Sets the delay speed of the keyboard back to normal when a file is CHAINed or LOADed.
formlist	Gives a formatted listing of any program held on disc.
cfl	Used by PROCformlist to check whether a colon is between quotation marks. If so it does not divide the line.
go	Called by PROCformlist, decodes the line numbers immediately following GOTOs and GOSUBs.
procs	Finds all the functions and procedures contained in a listing and gives their line numbers.
crs	Uses PROCcr1 to remove any spaces between the line number and the start of a line. It also removes any spaces between a DEF and either PROC or FN.
cr1	Removes spaces from a line.
loadsect	Is called by PROCcat and uses a machine code routine to load in the first four sectors of a disc at &7700.
cpls	Is called by PROCformlist. *L$* holds the line to be printed. If it is too long then it is split.
lng	Is called by PROCformlist if a token for a keyword has been recognised. It then checks whether adding the keyword to the line would make it too long and splits the line accordingly.

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```
1120 CLS:PRINTTAB(7,10)CHR$141CHR$13
2S$CHR$131"is LOCKED!":PRINTTAB(7,11)
CHR$141CHR$132S$CHR$131"is LOCKED!":F
ORX=1TO2000:NEXT
1130 *DR.0
1140 DN%=0
1150 PROCrestore:GOTO440
1160 DEFPROCtitle:T$="":FORZ%=&7700T
O&7707:T$=T$+CHR$?Z%:NEXT:FORZ%=&7800
TO&7803:T$=T$+CHR$?Z%:NEXT:PRINTTAB(0
,0)T$:PRINTTAB(12,0);CHR$137CHR$156CH
R$129CHR$157CHR$132"Drive"CHR$131STR$
(DN%)SPC2CHR$156;
1170 PRINTTAB(27,0);CHR$132CHR$157CH
R$135STR$(INT((?&7805*1)/8)+NN%*(?&7A
05/8))CHR$129"Files":ENDPROC
1180 DEFPROCfx:*FX4,0
1190 *FX11,20
1200 *FX12,2
1210 ENDPROC
1220 DEFPROCget
1230 PROCadval(200)
1240 IF6$<>"" ENDPROC
1250 IFAD%=1 6$=CHR$137:ENDPROC
1260 IFAD%=2 6$="C":ENDPROC
1270 GOTO1230
1280 DEFPROCadval(DL%):QT%=0
1290 AD%=ADVAL(0)AND3:6$=INKEY$(0):I
FAD%=0 AND 6$="" PNT%=0:GOTO1290
1300 IF6$<>"" ENDPROC
1310 IFPNT%=0 PNT%=1:GOTO1340
1320 Z1%=0:REPEATZ1%=Z1%+1:IF(ADVAL(
0)AND3)=0 PNT%=0:Z1%=200:QT%=1
1330 UNTILZ1%=200:IFQT%=1 GOTO1290
1340 ENDPROC
1350 DEFPROCforalist:CLS:PRINTTAB(8,
10)CHR$141CHR$132"FORMATTED LISTING":
PRINTTAB(8,11)CHR$141CHR$132"FORMATTE
D LISTING"
1360 ONERROR VDU7,3:IF ERR=17 MODE7:
VDU23;8202;0;0;0;:PROCrestore:CLOSE#0
:GOTO440 ELSE GOTO1540
1370 PROCss:PRINT'CHR$141CHR$130SPC7
"of file :"CHR$133S$:PRINTCHR$141CHR$
130SPC7"of file :"CHR$133S$
1380 PRINT'CHR$141CHR$129SPC5"Do you
 want a print-out?":PRINTCHR$141CHR$1
29SPC5"Do you want a print-out?"
1390 PN%=0:P$=GET$:IFP$="Y"ORP$="y"
CLS:VDU2,1,14:PRINTSPC6S$'':PN%=1:GOT
O1410
1400 CLS:VDU14
1410 B%=OPENUP$
1420 G%=BGET#B%:REPEAT:6%=BGET#B%:G1
%=BGET#B%:L$=STR$(6%*256+G1%)+" ":IFL
ENL$<6 L$=STRING$(6-LENL$," ")+L$
1430 IFL$="65534 " GOTO1540
1440 PRINTL$;:L$="":FL%=0:G%=BGET#B%
:FL1%=0:FORY%=1TO6%-3:G1%=BGET#B%
1450 IFG1%=&8B OR G1%=&8C PROCpls:L$
="":LGL%=0:PRINT'SPC6;
1460 IFG1%>127 IF FL%=0 AND LEN(L$+T
$(G1%-127))<30 L$=L$+T$(G1%-127) ELSE
 IFG1%>127 AND FL%=0 PROCllng
1470 IFG1%=141 PROCgo ELSE IFG1%>127
 AND FL%=1 L$=L$+CHR$G1%
1480 IFG1%=58 AND FL%=0 PROCpls:L$="
":LGL%=0:PRINT'SPC6;
1490 IFG1%>31 AND G1%<127 L$=L$+CHR$
G1%
1500 IFG1%=34 PROCfl
1510 IFG1%=13 Y%=6%-3
1520 NEXT:PROCpls:IFLENL$<>34 OR PN%
=1 PRINT
1530 LGL%=0:UNTILEOF#B%
1540 CLOSE#0:VDU3:*FX15,1
1550 VDU15:PRINT'CHR$141CHR$133CHR$1
36SPC2"Press ESCAPE to return to menu
":PRINTCHR$141CHR$133CHR$136SPC2"Pres
s ESCAPE to return to menu":REPEATUNT
IL0
1560 *FX3,0
1570 IF ERR=197 GOTO1090
1580 CLS:PRINTTAB(12,10)CHR$129CHR$1
41"DISK ERROR":PRINTTAB(12,11)CHR$129
CHR$141"DISK ERROR":PRINTTAB(8,14)CHR
$132CHR$141"INSERT ANOTHER DISK":PRIN
TTAB(8,15)CHR$132CHR$141"INSERT ANOTH
ER DISK"''
1590 PRINTSPC11CHR$141CHR$133"PRESS
 SPACE"'SPC11CHR$141CHR$133"PRESS  SP
ACE":REPEATUNTILGET=32:RUN
1600 DEFPROCfl:IFFL%=0 FL%=1 ELSE FL
%=0
1610 ENDPROC
1620 DEFPROCgo:G2%=BGET#B%:G3%=BGET#
B%:G4%=BGET#B%:IFG2%=68 L$=L$+STR$(G3
%+(G4%-64)*256)
1630 IFG2%=80 L$=L$+STR$(G3%-64+G4%*
256)
1640 IFG2%=84 L$=L$+STR$(G3%-64+(G4%
-64)*256)
1650 IFG2%=116 L$=L$+STR$(64+G3%+(G4
%-64)*256)
1660 IFG2%=100 OR G2%=96 L$=L$+STR$(
128+G3%+(G4%-64)*256)
1670 ENDPROC
1680 DEFPROCprocs:CLS:PROCss:PRINTTA
B(4,10)CHR$141CHR$132"LIST PROCEDURES
 & FUNCTIONS":PRINTTAB(4,11)CHR$141CH
R$132"LIST PROCEDURES & FUNCTIONS"
1690 ONERROR VDU7,3:IF ERR=17 MODE7:
VDU23;8202;0;0;0;:PROCrestore:CLOSE#0
:GOTO440 ELSE GOTO1540
1700 PRINT'CHR$141CHR$130SPC7"of fil
e : "CHR$133S$:PRINTCHR$141CHR$130SPC
7"of file : "CHR$133S$
1710 PRINT'CHR$141CHR$129SPC5"Do you
 want a print-out?":PRINTCHR$141CHR$1
29SPC5"Do you want a print-out?"
1720 P$=GET$:IFP$="Y"ORP$="y" CLS:VD
```

PROBLEM

WHEN using View I would like to make more use of my printer's facilities and I think I need a printer driver, buffer or generator. Being new to computing, I have found to my cost that buying the wrong thing can be expensive.

I am interested in extra memory for running longer Basic programs and games. I did think of an expansion board, but I have read in your reply to readers queries that it is not the answer.—G. Walkington, Bath.

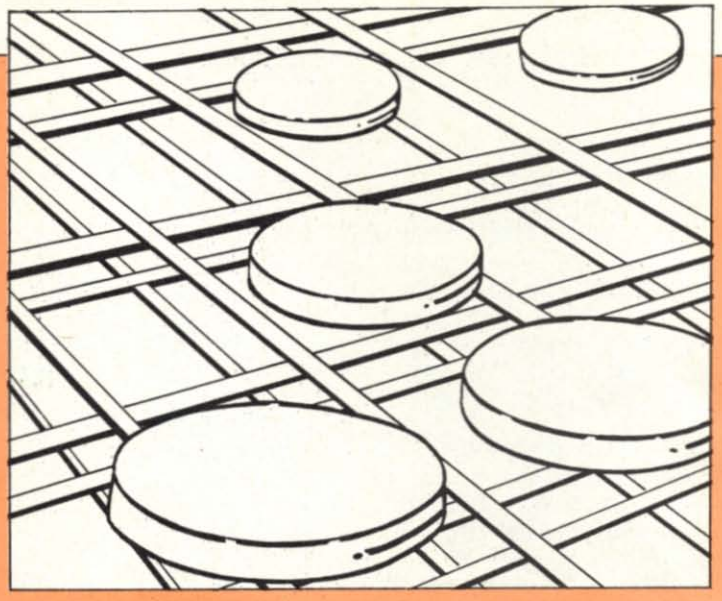
SOLVED

To use the extra features of your printer from View you need a printer driver, not a buffer or generator. To get extra memory for Basic programs you need a shadow RAM board like the Watford or the Aries B32 boards.

```
U2,1,14:PRINTSPC6S$'':GOTO1740
 1730 CLS:VDU14
 1740 B%=OPENUPS$:G%=BGET#B%:REPEATG1
%=BGET#B%:G2%=BGET#B%:LIN%=G1%*256+G2
%:NL%=BGET#B%:PROCrs:IFG1%=13 GOTO1790
 1750 IF(G1%=&DD AND G2%=&F2) OR (G1%
=&DD AND G2%=&A4) GOTO1760 ELSE FORT%
=1TO(NL%-3)-CT%:G%=BGET#B%:NEXT:GOTO1
790
 1760 P$="":PRINT;LIN%" ";:IFG2%=&F2
PRINT"PROC "; ELSE PRINT"FN ";
 1770 G%=BGET#B%:IFG%=0 OR G%=13 OR G
%=32 OR G%=58 GOTO1780 ELSE P$=P$+CHR
$G%:GOTO1770
 1780 PRINTP$:IF (NL%-LENP$)-CT%=5 GO
TO1790 ELSE FORT%=1 TO((NL%-LENP$)-5)
-CT%:G%=BGET#B%:NEXT
 1790 UNTIL EOF#B%:GOTO1540
 1800 DEFPROCrs:CT%=0:PROCr1:G1%=GT%:
IFG1%=&DD PROCr1:G2%=GT%:CT%=CT%-1:EN
DPROC
 1810 G2%=0:ENDPROC
 1820 DEFPROCr1:REPEATGT%=BGET#B%:CT%
=CT%+1:UNTILGT%<>32:ENDPROC
 1830 DEFPROCloadsect:RESTORE1840:FOR
Z%=0TO38:READ?(&C00+Z%):NEXT:CALL&C00
:ENDPROC
 1840 DATA &A5,&80,&8D,&1D,&0C,&A9,&0
4,&85,&81,&A9,&7F,&A0,&0C,&A2,&1D,&20
,&F1,&FF,&EE,&1F,&0C,&EE,&25,&0C,&C6,
&81,&D0,&ED,&60,&00,&00,&77,&00,&00,&
03,&53,&00,&00,&21
 1850 DEFPROCpls
 1860 IF(LENL$+LGL%)>34 PRINTLEFT$(L$
,34-LGL%);:GOTO1870 ELSE PRINTL$;:LGL
%=LENL$:ENDPROC
 1870 L$=RIGHT$(L$,LENL$-(34-LGL%)):L
GL%=0:IF PN% PRINT
 1880 PRINTSPC6;:GOTO1860
 1890 DEFPROCllng:FLG%=0:IFLENL$>33 F
LG%=1
 1900 PROCpls:L$=T$(G1%-127):IFFLG%=0
 PRINT'SPC6;:LGL%=0
 1910 ENDPROC
 1920 DATA AND,DIV,EOR,MOD,OR,ERROR,L
INE,OFF,STEP,SPC,TAB(,ELSE,THEN,,OPEN
IN,PTR,PAGE,TIME,LOMEM,HIMEM,ABS,ACS,
ADVAL,ASC,ASN,ATN,BGET,COS,COUNT,DEG,
ERL,ERR,EVAL,EXP,EXT,FALSE,FN,GET,INK
EY,INSTR(,INT,LEN,LN,LOG,NOT,OPENUP,O
PENOUT,PI,POINT(
 1930 DATA POS,RAD,RND,SGN,SIN,SQR,TA
N,TO,TRUE,USR,VAL,VPOS,CHR$,GET$,INKE
Y$,LEFT$(,MID$(,RIGHT$(,STR$,STRING$(
,EOF,AUTO,DELETE,LOAD,LIST,NEW,OLD,RE
NUMBER,SAVE,,PTR,PAGE,TIME,LOMEM,HIME
M,SOUND,BPUT,CALL,CHAIN,CLEAR,CLOSE,C
LG,CLS,DATA,DEF
 1940 DATA DIM,DRAW,END,ENDPROC,ENVEL
OPE,FOR,GOSUB,GOTO,GCOL,IF,INPUT,LET,
LOCAL,MODE,MOVE,NEXT,ON,VDU,PLOT,PRIN
T,PROC,READ,REM,REPEAT,REPORT,RESTORE
,RETURN,RUN,STOP,COLOUR,TRACE,UNTIL,W
IDTH,OSCLI
 1950 DEFPROCinitasscode
 1960 FOR PASS=0 TO 2 STEP 2
 1970 P%=&900
 1980 [OPT PASS
 1990 .save
 2000 LDY #4
 2010 .loop1
 2020 LDX #0
 2030 .loop2
 2040 .hi1
 2050 LDA &7C00,X
 2060 .lo1
 2070 STA &7300,X
 2080 INX:CPX #0:BNE loop2
 2090 DEY
 2100 INC hi1+2
 2110 INC lo1+2
 2120 CPY #0:BNE loop1
 2130 LDA #&7C:STA hi1+2
 2140 LDA #&73:STA lo1+2
 2150 RTS
 2160 .restore
 2170 LDY #4
 2180 .loop3
 2190 LDX #0
 2200 .loop4
 2210 .lo2
 2220 LDA &7300,X
 2230 .hi2
 2240 STA &7C00,X
 2250 INX:CPX #0:BNE loop4
 2260 DEY
 2270 INC hi2+2
 2280 INC lo2+2
 2290 CPY #0:BNE loop3
 2300 LDA #&7C:STA hi2+2
 2310 LDA #&73:STA lo2+2
 2320 RTS
 2330 ]NEXT
 2340 ENDPROC
 2350 DEFPROChelp:CLS:PRINTSPC14CHR$1
41CHR$130"HELP"'SPC14CHR$141CHR$130"H
ELP"''"1"CHR$132"Display menu 1"'"2"C
HR$132"Display menu 2"'"A"CHR$132"Loc
k all files"'"C"CHR$132"Chain a progr
am"
 2360 PRINT"D"CHR$132"Delete a file"'
"E"CHR$132"Merge two programs"'"F"CHR
$132"Display a formatted program list
ing"'"H"CHR$132"Display this HELP pag
e"'"I"CHR$132"Display file informatio
n"
 2370 PRINT"K"CHR$132"Lock a file"'"L
"CHR$132"Load a program"'"M"CHR$132"D
ump a file to screen"'"N"CHR$132"Chan
ge current drive"'"O"CHR$132"Compact
disk in current drive"'"P"CHR$132"Dis
play list of program's PROCs & FNs"
 2380 PRINT"T"CHR$132"Title disc"'"U"
CHR$132"Unlock a file"'"*"CHR$132"*RU
N a machine code program"'"ESC"CHR$13
2"Catalogue disk in drive 0":GOTO910
 2390 DEFPROCmerge:VDU31,0,3:PRINTSTR
ING$(120," ");:VDU31,0,3:PRINTSPC14CH
R$133"MERGE FILES"'CHR$130;:INPUT"Ent
er 1st file name",file1$:VDU130:INPUT
"Enter 2nd file name",file2$:VDU31,0,
3:PRINTSTRING$(120," "):ON ERROR GOTO
2420
 2400 VDU31,0,3:PRINTSPC14CHR$133"MER
GE FILES"'CHR$129;:INPUT"Enter new fi
le name",file3$:IFfile1$=file2$ OR fi
le1$=file3$ OR file2$=file3$ GOTO2420
 ELSE PRINTCHR$132SPC16"Merging"
 2410 F1%=OPENUPfile1$:F2%=OPENUPfile
2$:F3%=OPENOUTfile3$:REPEATBPUT#F3%,B
GET#F1%:UNTILEOF#F1%:PTR#F3%=PTR#F3%-
1:DUMMY%=BGET#F2%:REPEATBPUT#F3%,BGET
#F2%:UNTILEOF#F2%:CLOSE#0:ENDPROC
 2420 CLS:VDU31,10,10,141,129,136:PRI
NT"MERGE  ERROR"'SPC10CHR$141CHR$129C
HR$136"MERGE  ERROR":PRINT''SPC12;:RE
PORT:PRINT''':GOTO1590
 2430 DEFPROClockall:*AC. *.* L
 2440 ENDPROC
 2450 DEFPROCtitledisc:VDU28,0,5,39,3
:CLS:PRINTCHR$133"Enter disc title":I
NPUT LINE " ",TITLE$:$CLI%="TITLE "+T
ITLE$:X%=CLI% MOD &100:Y%=CLI% DIV &1
00:CALL &FFF7:ENDPROC
 2460 DEFPROCosword(D3%,D4%):X%=OSWOR
D% MOD &100:Y%=OSWORD% DIV &100:!OSWO
RD%=&FFFF:?OSWORD%=D3% MOD &100:?(OSW
ORD%+1)=D3% DIV &100:A%=D4%:CALL&FFF1
:ENDPROC
 2470 DEFPROCsave:IF TUBE% ENDPROC EL
SE CALL &900:ENDPROC
 2480 DEFPROCrestore:IF TUBE% RUN ELS
E CALL &925:ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 139.

From Page 81



```
100 REM       4-SITE
110 REM
120 REM   By Robin Nixon
130 REM (c) The Micro User
140 REM
150 REM
160 MODE7:VDU23;8202;0;0;0;:PROCtit
le:MODE2:VDU23;8202;0;0;0;:COLOUR133:
CLS:DIMA%(4,4,4),B%(4,4,4):GO%=0:CP%=
0:NM%=0:ENVELOPE1,2,127,127,127,31,255
,255,127,48,-1,-16,61,116:VDU23,251,2
55,255,255,255,255,255,255,255,255
170 *FX9,30
180 *FX10,30
190 VDU23,252,252,224,128,0,0,128,2
24,252,23,253,63,7,1,0,0,1,7,63
200 VDU5,23,254,3,31,127,255,255,12
7,31,3,23,255,192,248,254,255,255,254
,248,192:PROCbanner:GCOL0,0:MOVE432,9
70:PRINTSTRING$(6,CHR$251):GCOL0,9:MO
VE432,970:PRINT"4-SITE":PROCboard:FOR
Z%=1TO4:FORX%=1TO4:FORY%=1TO4
210 PROCcounter(X%,Y%,Z%,0,7,2):NEX
TY%,X%,Z%:FORZ%=1TO10000:NEXT:NM%=0
220 *FX9,6
230 *FX10,6
240 ON RND(2) GOTO250,260
250 SOUND1,-15,150,2:SOUND1,-15,75,
2:PROCplayers_move:NM%=NM%+1:PROCbann
er:CP%=1:PROCcomputer_play
260 CP%=0:PROCbanner:MOVE428,980:GC
OL0,5:PRINT"My move":PROCcomputer_pla
y:CP%=1:NM%=NM%+1:PROCbanner:PROCcomp
uter_play:CP%=0:GOTO250
270 DEFPROCboard:FORA%=1TO4:PROCdia
mond(A%,0,1):NEXT:ENDPROC
280 DEFPROCdiamond(A%,X%,Y%):GCOLX%
,Y%:PLOT4,0,A%*228-128:PLOT5,639,A%*2
28-228:PLOT85,639,A%*228-28:PLOT85,12
79,A%*228-128:ENDPROC
290 DEFPROCcounter(X%,Y%,Z%,B%,C%,D
C%):GCOLB%,C%:MOVEX%*150+Y%*150-174,Z
%*228-110+X%*24-Y%*24:VDU252+DC%,253+
DC%:ENDPROC
300 DEFPROCbanner:GCOL0,2:PLOT4,0,1
023:PLOT4,0,900:PLOT85,1279,1023:PLOT
85,1279,900:ENDPROC
310 DEFPROCplayers_move:PROCbanner:
MOVE364,1010:GCOL0,5:PRINT"Your move"
320 PROCchoose_level:PROCchoose_row
:PROCchoose_play:IFA%(T3%,T2%,T1%) PR
OCbanner:MOVE264,1010:GCOL0,1:PRINT"I
llegal move":SOUND1,-15,30,10:GOTO310
ELSE A%(T3%,T2%,T1%)=1:PROCcounter(T
3%,T2%,T1%,0,2,2):ENDPROC
330 DEFPROCchoose_level:T1%=0:MOVE2
68,950:GCOL0,4:PRINT"Select level":RE
PEATT1%=T1%+1:IFT1%=5 T1%=1
340 PROChi_lite(7)
350 REPEATUNTIL(ADVAL(0)AND3)=0 AND
INKEY(-99)=0 AND INKEY(-74)=0:REPEAT
AD%=ADVAL(0)AND3:IN1%=INKEY(-99):IN2%
=INKEY(-74):UNTILAD%>0 AND AD%<3 OR I
N1% OR IN2%:SOUND1,-15,100,2:PROChi_l
ite(5):UNTILAD%=2 OR IN2%:ENDPROC
360 DEFPROChi_lite(C%):GCOL0,C%:MOV
E0,T1%*228-64:VDU125:MOVE0,T1%*228-16
8:VDU125:MOVE1223,T1%*228-64:VDU123:M
OVE1223,T1%*228-168:VDU123:ENDPROC
370 DEFPROCchoose_row:T2%=0:PROCban
ner:MOVE310,980:GCOL0,4:PRINT"Select
row":REPEATT2%=T2%+1:IFT2%=5 T2%=1
380 FORN%=1TO4:PROCcounter(N%,T2%,T
1%,0,8,0):NEXT:REPEATUNTIL(ADVAL(0)AN
D3)=0 AND INKEY(-99)=0 AND INKEY(-74)
=0
390 REPEATAD%=ADVAL(0)AND3:IN1%=INK
EY(-99):IN2%=INKEY(-74):UNTILAD%>0 AN
D AD%<3 OR IN1% OR IN2%:SOUND1,-15,10
0,2:FORN%=1TO4:PROCcounter(N%,T2%,T1%
,0,1,0):NEXT:UNTILAD%=2 OR IN2%:ENDPR
OC
400 DEFPROCchoose_play:T3%=0:PROCba
nner:MOVE300,980:GCOL0,4:PRINT"Select
 play":REPEATT3%=T3%+1:IFT3%=5 T3%=1
410 PROCcounter(T3%,T2%,T1%,0,8,0):
REPEATUNTIL(ADVAL(0)AND3)=0 AND INKEY
(-99)=0 AND INKEY(-74)=0
420 REPEATAD%=ADVAL(0)AND3:IN1%=INK
EY(-99):IN2%=INKEY(-74):UNTILAD%>0 AN
D AD%<3 OR IN1% OR IN2%:SOUND1,-15,10
0,2:PROCcounter(T3%,T2%,T1%,0,1,0):UN
TILAD%=2 OR IN2%:SOUND1,-15,20,2:ENDP
ROC
430 DEFPROCclear_b:LOCALA%,B%,C%:FO
RA%=1TO4:FORB%=1TO4:FORC%=1TO4:B%(A%,
B%,C%)=0:NEXTC%,B%,A%:ENDPROC
440 DEFPROCcomputer_play:IFCP%=1 GC
OL0,6:MOVE432,970:PRINTSTRING$(6,CHR$
251):GCOL0,1:MOVE432,970:PRINT"4-SITE
"
450 IFNM%=64 PROCgame_over ELSE PRO
Cclear_b:FORZ%=1TO4:FORY%=1TO4:P%=0:C
%=0:FORX%=1TO4:PROCcount:NEXT:PROCwei
ght:IFA1%=0 GOTO470
460 FORN%=1TO4:PROCadd_weight(N%,Y%
,Z%):NEXT
470 NEXTY%,Z%
480 FORZ%=1TO4:FORX%=1TO4:P%=0:C%=0
:FORY%=1TO4:PROCcount:NEXT:PROCweight
:IFA1%=0 GOTO500
490 FORN%=1TO4:PROCadd_weight(X%,N%
,Z%):NEXT
500 NEXTX%,Z%
510 FORX%=1TO4:FORY%=1TO4:P%=0:C%=0
:FORZ%=1TO4:PROCcount:NEXT:PROCweight
:IFA1%=0 GOTO530
520 FORN%=1TO4:PROCadd_weight(X%,Y%
,N%):NEXT
530 NEXTY%,X%
540 FORX%=1TO4:P%=0:C%=0:FORY%=1TO4
:Z%=Y%:PROCcount:NEXT:PROCweight:IFA1
%=0 GOTO560
550 FORN%=1TO4:PROCadd_weight(X%,N%
,N%):NEXT
560 NEXT
570 FORX%=4TO1STEP-1:P%=0:C%=0:FORY
%=1TO4:Z%=5-Y%:PROCcount:NEXT:PROCwei
ght:IFA1%=0 GOTO590
580 FORN%=1TO4:PROCadd_weight(X%,N%
,5-N%):NEXT
590 NEXT
600 FORY%=1TO4:P%=0:C%=0:FORX%=1TO4
```

```
:Z%=X%:PROCcount:NEXT:PROCweight:IFA1
%=0 GOTO620
  610 FORN%=1TO4:PROCadd_weight(N%,Y%
,N%):NEXT
  620 NEXT
  630 FORY%=4TO1STEP-1:P%=0:C%=0:FORX
%=4TO1STEP-1:Z%=5-X%:PROCcount:NEXT:P
ROCweight:IFA1%=0 GOTO650
  640 FORN%=1TO4:PROCadd_weight(5-N%,
Y%,N%):NEXT
  650 NEXT
  660 FORZ%=1TO4:P%=0:C%=0:FORX%=1TO4
:Y%=X%:PROCcount:NEXT:PROCweight:IFA1
%=0 GOTO680
  670 FORN%=1TO4:PROCadd_weight(N%,N%
,Z%):NEXT
  680 NEXT
  690 FORZ%=1TO4:P%=0:C%=0:FORX%=1TO4
:Y%=5-X%:PROCcount:NEXT:PROCweight:IF
A1%=0 GOTO710
  700 FORN%=1TO4:PROCadd_weight(N%,5-
N%,Z%):NEXT
  710 NEXT
  720 P%=0:C%=0:FORX%=1TO4:Y%=X%:Z%=X
%:PROCcount:NEXT:PROCweight:IFA1%=0 G
OTO740
  730 FORN%=1TO4:PROCadd_weight(N%,N%
,N%):NEXT
  740 P%=0:C%=0:FORX%=4TO1STEP-1:Y%=5
-X%:Z%=5-X%:PROCcount:NEXT:PROCweight
:IFA1%=0 GOTO760
  750 FORN%=1TO4:PROCadd_weight(5-N%,
N%,N%):NEXT
  760 P%=0:C%=0:FORY%=4TO1STEP-1:X%=5
-Y%:Z%=5-Y%:PROCcount:NEXT:PROCweight
:IFA1%=0 GOTO780
  770 FORN%=1TO4:PROCadd_weight(N%,5-
N%,N%):NEXT
  780 P%=0:C%=0:FORY%=4TO1STEP-1:X%=Y
%:Z%=5-Y%:PROCcount:NEXT:PROCweight:I
FA1%=0 GOTO800
  790 FORN%=1TO4:PROCadd_weight(5-N%,
5-N%,N%):NEXT
  800 IFGO% PROCgame_over
  810 IFCP% ENDPROC
  820 BS%=0:FORX%=1TO4:FORY%=1TO4:FOR
Z%=1TO4:IF B%(X%,Y%,Z%)>BS% BS%=B%(X%
,Y%,Z%)
  830 NEXTZ%,Y%,X%
  840 XX%=RND(4):YY%=RND(4):ZZ%=RND(4
):X1%=0:Y1%=0:Z1%=0
  850 FORX%=XX%TO4:FORY%=YY%TO4:FORZ%
=ZZ%TO4:IFB%(X%,Y%,Z%)=BS% AND A%(X%,
Y%,Z%)=0 X1%=X%:Y1%=Y%:Z1%=Z%:X%=4:Y%
=4:Z%=4
  860 NEXTZ%,Y%,X%
  870 IFX1%+Y1%+Z1%=0 XX%=1:YY%=1:ZZ%
=1:GOTO850
  880 A%(X1%,Y1%,Z1%)=-1:PROCcounter(
X1%,Y1%,Z1%,0,8,2):SOUND1,-15,200,2:P
ROCbanner:MOVE272,980:GCOL0,1:PRINT"P
ress a key":REPEATUNTIL(ADVAL(0)AND3)
>0 OR INKEY(-99) OR INKEY(-74):PROCco
unter(X1%,Y1%,Z1%,0,4,2):SOUND1,-15,1
0,2:ENDPROC
  890 DEFPROCcount:GO2%=0:IFA%(X%,Y%,
Z%)=1 P%=P%+1
  900 IFA%(X%,Y%,Z%)=-1 C%=C%+1
  910 ENDPROC
  920 DEFPROCweight:A1%=0:IFC%=0 AND
P%=3 A1%=10000
  930 IFP%=0 AND C%=3 A1%=10500
  940 IFC%=0 AND P%>0 OR P%=0 AND C%>
0 A1%=A1%+(C%+P%)^2
  950 IFC%=4 W%=-1 ELSE IFP%=4 W%=1
  960 IFC%=4 OR P%=4 GO%=1:GO2%=1:FOR
Q%=1TO1400STEP70:SOUND1,1,Q%,2:SOUND2
,1,Q%+73,2:NEXT
  970 ENDPROC
  980 DEFPROCadd_weight(X1%,Y1%,Z1%):
IFGO2%=1 PROCcounter(X1%,Y1%,Z1%,0,8,
0)
  990 IFA%(X1%,Y1%,Z1%)=0 B%(X1%,Y1%,
Z1%)=B%(X1%,Y1%,Z1%)+A1%
 1000 ENDPROC
 1010 DEFPROCgame_over:PROCbanner:IFW
%=-1 GCOL0,1:MOVE0,970:PRINT"I won af
ter ";NM%;" moves"
 1020 IFW%=1 GCOL0,4:GCOL0,1:MOVE32,9
70:PRINT"You won in ";NM%;" moves"
 1030 IFW%=0 GCOL0,0:MOVE0,970:PRINT"
Well done Drawn game"
 1040 REPEATUNTIL(ADVAL(0)AND3)>0 OR
INKEY(-99) OR INKEY(-74):REPEATUNTIL(
ADVAL(0)AND3)=0 AND INKEY(-99)=0 AND
INKEY(-74)=0:RUN
 1050 DEFPROCtitle:FORZ%=0TO24:VDU31,
0,Z%,132,157,131:NEXT:VDU31,13,1,141,
129,157,134:PRINT"4-SITE";:VDU32,132,
157,31,13,2,141,129,157,134:PRINT"4-S
ITE";:VDU32,132,157,28,3,24,37,4
 1060 FORZ%=1TO17:READZ$:PRINTZ$:NEXT
:PROCcontinue:CLS
 1070 FORZ%=1TO15:READZ$:PRINTZ$:NEXT
:PROCcontinue:ENDPROC
 1080 DEFPROCcontinue:VDU31,1,18,141,
133,157,129:PRINTSPC7"PRESS A KEY";SP
C8;:VDU132,157:PRINT:VDU32,141,133,15
7,129:PRINTSPC7"PRESS A KEY";SPC8;:VD
U132,157:PRINT:REPEATUNTIL(ADVAL(0)AN
D3)>0 OR INKEY(-99) OR INKEY(-74)
 1090 REPEATUNTIL(ADVAL(0)AND3)=0 AND
 INKEY(-99)=0 AND INKEY(-74)=0:ENDPRO
C
 1100 DATA 4-SITE is a 3-dimensional
game
 1110 DATA resembling noughts & cross
es.
 1120 DATA
 1130 DATA The object of the game is
to get
 1140 DATA a line of 4 counters in a
row in
 1150 DATA "any horizontal, vertical
or"
 1160 DATA diagonal direction.
 1170 DATA
 1180 DATA To make a move you must fi
rst
 1190 DATA select a level by pressing
the
 1200 DATA SPACE BAR. When you have c
hosen a
 1210 DATA level you press RETURN.
 1220 DATA
 1230 DATA You then select the row yo
u want
 1240 DATA by pressing the SPACE BAR
and then
 1250 DATA RETURN.
 1260 DATA
 1270 DATA To select a position withi
n a row
 1280 DATA you again use the SPACE BA
R and
 1290 DATA press RETURN to enter that
 move.
 1300 DATA
 1310 DATA After I make a move my cou
nter
 1320 DATA will flash until you press
 a key
 1330 DATA so that you can evaluate m
y move.
 1340 DATA
 1350 DATA My counters are BLUE.
 1360 DATA
 1370 DATA Your counters are GREEN.
 1380 DATA ,,
 1390 DATA Good luck!
```

This listing is included in this month's cassette tape offer. See order form on Page 139.

From Page 79

```
510 NEXT
520 ENDPROC
530 DEF FNREADCH(X,Y)
540 LOCAL AX,LASTX,LASTY,C
550 LASTX=POS
560 LASTY=VPOS
570 VDU31,X,Y
580 AX=135
590 C=USR(&FFF4)
600 C=C AND &FFFF
610 C=C DIV &100
620 VDU31,LASTX,LASTY
630 = CHR$(C)
640 DEFPROCchek
650 COLOUR134
660 REPEAT
670 IF screenX<>2 AND screenX<>5 TH
EN PROCenergy(.04)
680 IF INKEY(-89)THEN PROChit
690 IF INKEY(-98)ANDXX>1THENMX=1:PR
OCmove(-1,0)
700 IF INKEY(-67)ANDXX<14THENMX=2:P
ROCmove(1,0)
710 IF INKEY(-73)ANDYX>1THENMX=3:PR
OCmove(0,-1)
720 IF INKEY(-105)ANDYX<29THENMX=4:
PROCmove(0,1)
730 IF INKEY(-85) AND livesX>0THEN
nX=1:PROClose
740 IF INKEY(-82)THEN*FX210,0
750 IF INKEY(-17)THEN*FX210,1
760 IF INKEY(-68)THENPROCfreeze
770 UNTIL livesX=0
780 ENDPROC
790 DEFPROCmove(AX,BX)
800 CX=XX:DX=YX:XX=XX+AX:YX=YX+BX
810 IF FNREADCH(CX,(DX+tX))=CHR$132
 THEN GX=1 ELSE GX=0
820 IF FNREADCH(XX,YX)=CHR$134 THEN
 eaX=1:PROCenergy(2.5):eaX=0:SOUND0,-
12,5,1:GOTO 840
830 IF FNREADCH(XX,YX)=CHR$133 THEN
 PROCgeaf
840 IF FNREADCH(XX,YX)<>CHR$132 THE
N SX=1:COLOUR4:PRINTTAB(XX,YX);CHR$(1
27+MX):COLOUR6:PRINTTAB(CX,DX);" " EL
SE XX=CX:YX=DX:SX=0
850 COLOUR1:IF livesX=0 THEN ENDPRO
C
860 IF GX=1 AND SX=1 THEN PROCbolf
870 ENDPROC
880 DEFPROCsetup
890 VDU28,0,31,19,0:COLOUR135:COLOU
R1
900 PRINTTAB(16,5);CHR$128;".";live
sX;TAB(16,2);CHR$133;".0 "
910 RESTORE 1930
920 COLOUR4
930 FOR WX=1 TO 8:READ Q$:PRINTTAB(
16,(9+(WX*2)));Q$:NEXT
940 COLOUR134
950 PRINTTAB(17,8);"f";TAB(17,29);"
e"
960 ENDPROC
970 DEFPROCbolf
980 COLOUR134:UX=0:LX=0:KX=0
990 REPEAT:LX=LX+tX
1000 IF FNREADCH(CX,(DX+LX))=CHR$132
 THEN UX=UX+sX ELSE KX=1
1010 UNTIL KX=1
1020 lX=0:kX=0
1030 REPEAT:PX=0
1040 IF FNREADCH(CX,(DX+kX))=" " THE
N PX=1:GOTO 1060
1050 IF FNREADCH(CX,(DX+kX))<CHR$132
 AND (DX+kX)<30 AND (DX+kX)>0 THEN lX
=1:PX=1
1060 IF PX=1 THEN COLOUR0:PRINTTAB(C
X,(DX+kX));CHR$132:PRINTTAB(CX,(DX+kX
)-UX);" ":kX=kX+sX
1070 SOUND3,-12,(148-(4*kX)),1
1080 UNTIL PX=0
1090 IF lX=1 THEN PROClose
1100 SX=0
1110 ENDPROC
1120 DEFPROClose
1130 livesX=livesX-1
1140 COLOUR1:COLOUR135
1150 PRINTTAB(18,5);livesX
1160 FOR IX=250 TO 0 STEP-5:SOUND1,0
,IX,1:SOUND0,-15,3,1:NEXT
1170 IF livesX=0 THEN PROCend:ENDPRO
C
1180 IF nX=1 THEN PROCbuild:nX=0
1190 energy=200:tarX=190:dX=0:SX=0
1200 PROCmen:PROCchek
1210 ENDPROC
1220 DEFPROChit
1230 IF MX=1 THEN ZX=-2:VX=-1  ELSE
ZX=2:VX=1
1240 IF FNREADCH((XX+VX),(YX))<>CHR$
132 THEN ENDPROC
1250 IF FNREADCH((XX+VX),(YX+tX))=CH
R$132 THEN ENDPROC
1260 IF FNREADCH((XX+ZX),YX)=" " THE
N COLOUR0:PRINTTAB((XX+ZX),YX);CHR$13
2:PRINTTAB((XX+VX),YX);" " ELSE ENDPR
OC
1270 CX=XX+ZX:DX=DX-tX
1280 PROCbolf:PROCbolabov:PROCenergy
(3)
1290 ENDPROC
1300 DEFPROCgeaf
1310 FOR PX=1 TO 6
1320 IF SX(PX)=XX AND TX(PX)=YX AND
DIAX(PX)=1 THEN geaX=geaX+1:DIAX(PX)=
0
1330 NEXT
1340 COLOUR1:COLOUR135
1350 PRINTTAB(18,2);geaX
1360 SOUND 1,1,100,1
1370 IF geaX MOD 6=0 THEN PROCnewscr
een
1380 COLOUR134
1390 ENDPROC
1400 DEFPROCman
1410 IF energy=200 THEN VDU28,17,28,
17,9:COLOUR129:CLS:VDU28,0,31,19,0
1420 COLOUR4:COLOUR134
1430 RESTORE2060:FOR EX=1 TO (screen
X+1):READ XX,YX:NEXT
1440 PRINTTAB(XX,YX);CHR$128
1450 CX=6:DX=6
1460 ENDPROC
1470 DEFPROCenergy(e)
1480 energy=energy-e
1490 COLOUR131
1500 IF energy<tarX THEN PRINTTAB(17
,(9+dX));" ":tarX=tarX-10:dX=dX+1
1510 COLOUR134
1520 IF energy<0 AND eaX=1 THEN PRIN
TTAB(CX,DX)" "
1530 IF energy<0 AND eaX=0 THEN PRIN
TTAB(XX,YX)" "
1540 IF energy<0 AND GX=1 THEN PROCb
olf
1550 IF energy<0 THEN PROCbolabov:PR
OClose
1560 ENDPROC
1570 DEFPROCend
1580 VDU28,2,18,13,13:COLOUR135:COLO
UR4:CLS
1590 PRINTTAB(1,1);"Game  Over";TAB(
0,3);"Press a Key!"
1600 *FX21
1610 A=GET
1620 ENDPROC
1630 DEFPROCname
1640 RESTORE 1940:FOR yX=0 TO screen
X:READ A$:NEXT
1650 COLOUR135:COLOUR0:PRINTTAB(2,30
);A$
1660 ENDPROC
1670 DEFPROCbolabov
1680 IF eaX=1 THEN XX=CX:YX=DX ELSE
CX=XX:DX=YX
1690 IF FNREADCH(XX,(YX+tX))=CHR$132
 THEN PROCbolf
1700 ENDPROC
```

```
1710 DEFPROCfreeze
1720 COLOUR128:COLOUR7:PRINTTAB(4,8)
;"*FREEZE*"
1730 A$=INKEY$(0):IFA$="R"THEN COLOU
R133:PRINTTAB(4,8);SPC(8):ENDPROC
1740 GOTO 1730
1750 ENDPROC
1760 DEFPROCinst
1770 VDU28,0,31,19,0:COLOUR6:COLOUR1
28:CLS
1780 PRINTTAB(3,0);"CAVERN QUEST";TA
B(3,1);"====== ======"
1790 PRINTTAB(12,6);"I";TAB(12,8);"X
";TAB(12,10);"*";TAB(12,12);"?";TAB(1
2,14);"]";TAB(17,16);"H"
1800 PRINTTAB(3,26);"HIGH SCORE -"
1810 IF gem%>HS% THEN HS%=gem%:COLOU
R14:PRINTTAB(5,24);"** NEW  **" ELSE
COLOUR6:PRINTTAB(3,24);"Last Score -"
:COLOUR1:PRINTTAB(16,24);gem%
1820 COLOUR3
1830 PRINTTAB(0,3);"KEYS";TAB(0,4);"
----";TAB(1,18);"S/Q  SOUND/QUIET";TA
B(1,20);"F/R  FREEZE/RESTORE"
1840 COLOUR5
1850 PRINTTAB(5,6);"LEFT -";TAB(4,8)
;"RIGHT -";TAB(7,10);"UP -";TAB(5,12)
;"DOWN -";TAB(5,14);"PUSH -";TAB(0,16
);"IF STUCK PRESS -"
1860 COLOUR1
1870 PRINTTAB(16,26);HS%
1880 COLOUR0
1890 PRINTTAB(1,29)"PRESS <SPACE BAR
>"
1900 *FX21,0
1910 A=GET
1920 ENDPROC
1930 DATA *,Q,X,Y,G,E,M,*
1940 DATA Maniac Miner
1950 DATA Cecil's  Pit
1960 DATA Impossible??
1970 DATA Men at Work?
1980 DATA Crazy Cavern
1990 DATA Finally....?
2000 DATA 101
2010 DATA 2,2,13,2,6,9,14,16,5,27,14
,25
2020 DATA 102
2030 DATA 5,28,13,24,13,15,12,12,8,3
,3,13
2040 DATA 103
2050 DATA 1,6,2,24,7,26,7,19,13,16,1
2,5
2060 DATA 7,17,1,1,10,29,7,17,6,1,3,
3
2070 DATA 101
2080 DATA 2,2,2,1,1,1,1,1,1,1,2,2,2,2,
2,2,1,2,1,1,1,0,0,0
2090 DATA 1,1,1,1,2,2,1,2,1,1,1,0,1,
1,2,2,2,2,2,1,2,1,1
2100 DATA 1,1,0,1,1,1,1,1,1,1,1,1,1,
1,1,1,0,1,1,1,1,1,1
2110 DATA 1,1,0,0,0,0,0,0,0,0,0,0,0,
0,0,1,0,1,1,1,1,1,0
2120 DATA 1,1,0,1,1,1,1,1,0,2,2,2,2,2,
0,1,1,0,1,1,1,1,1,0
2130 DATA 1,1,1,1,2,0,1,1,0,1,1,1,1,
0,1,1,1,2,2,0,1,1,0
2140 DATA 1,1,1,1,0,1,1,1,1,2,0,0,0,
0,0,0,1,1,0,1,1,1,1
2150 DATA 1,0,2,2,2,2,2,2,1,0,1,1,1,
1,1,0,1,2,1,1,1,1,1
2160 DATA 0,0,0,0,0,1,0,1,2,1,1,1,1,
1,0,1,1,1,0,1,0,1,1
2170 DATA 1,1,2,2,1,0,1,0,1,0,1,0,1,
2,1,1,1,1,1,0,1,0
2180 DATA 1,0,0,0,1,2,1,1,2,2,1,0,1,
0,1,0,1,0,2,2,2,2,2
2190 DATA 2,1,0,1,0,1,0,1,0,1,1,1,1,
1,1,1,0,1,1,1,0,1,0
2200 DATA 0,0,0,0,0,0,1,0,0,0,0,0,0,
0,0,0,0,0,0,0,1,1,0
2210 DATA 1,1,1,1,1,0,0,1,1,1,1,1,1,
0,1,1,1,1,1,0,0,2,0,0
2220 DATA 0,0,1,0,0,0,0,0,0,0,0,2,2,
2,2,2,1,0,0,1,1,2
2230 DATA 1,1,0,2,1,1,1,1,1,0,1,1,2,
2,1,1,0,2,1,2,2,2,1
2240 DATA 0,1,2,1,1,1,1,0,2,1,2,2,2,
1,0,1,1,2,1,1,1,0,2
2250 DATA 1,2,2,2,1,0,1,1,2,2,1,1,0,
1,1,2,2
2260 DATA 102
2270 DATA 0,0,2,2,2,1,1,2,1,2,0,2,0,
0,2,1,1,1,1,2,1,1,2
2280 DATA 1,1,2,2,0,1,2,2,0,1,2,2,0,
1,2,1,1,1,0,1,1,1,1
2290 DATA 2,1,1,2,2,2,2,2,0,0,1,1,1,
1,2,0,0,1,1,1,1,1,0
2300 DATA 2,1,0,0,0,1,0,0,2,2,2,2,2,
0,2,1,0,1,1,2,2,2,1
2310 DATA 1,1,1,1,2,1,1,0,1,1,1,1,1,
1,2,2,2,2,2,2,1,0
2320 DATA 0,0,0,0,0,0,1,1,1,1,1,1,1,
1,1,1,1,1,1,0,2,1,2
2330 DATA 2,2,2,1,1,1,1,1,1,1,0,2,1,
2,2,2,1,2,2,2,2,2,0
2340 DATA 0,0,2,1,2,1,1,1,1,1,1,1,1,
0,1,1,2,1,1,1,1,2,0
2350 DATA 2,2,2,2,0,1,1,1,1,2,2,2,2,
0,2,1,1,1,0,1,1,1,1
2360 DATA 1,1,1,1,0,2,1,1,0,0,0,0,0,
2,0,2,0,2,0,2,1,1
2370 DATA 0,0,1,1,0,2,0,2,0,2,0,2,2,
2,0,0,1,1,0,2,0,1,0
2380 DATA 2,0,1,1,1,2,0,1,1,0,2,0,1,
0,1,2,2,2,2,1,0,1,1
2390 DATA 0,2,2,2,1,2,1,1,1,1,0,0,1,
1,0,2,1,1,0,1,1,1,0
2400 DATA 0,0,1,1,1,0,2,1,2,1,2,1,1,
0,1,0,1,1,1,0,2,1,2
2410 DATA 1,2,1,1,0,1,0,1,1,1,0,2,1,
2,0,2,1,1,0,1,0,1
2420 DATA 0,0,0,2,1,2,1,2,1,1,0,0,0,
0,0,1,2,2,1,2,1,2,1
2430 DATA 1,1,2,0,2,2,2,2,2,1,1,0,1,
1,1,1,2,0,2,2,1,1,2
2440 DATA 1,1,0,1,1,1,1,2,2,2,2,1,1,
1,0,0,0
2450 DATA 103
2460 DATA 0,0,0,0,2,2,1,1,2,2,1,1,1,
1,0,0,0,0,2,1,2,2,1
2470 DATA 2,1,1,1,1,0,0,0,0,2,0,1,1,
0,2,1,1,1,1,0,0,0,0
2480 DATA 2,0,0,0,0,2,1,2,1,1,2,2,2,
2,2,0,0,0,0,2,1,1,1
2490 DATA 1,1,1,2,1,2,0,0,0,0,2,1,0,
1,1,2,2,2,0,2,0,0,0
2500 DATA 0,2,1,0,1,1,1,1,2,0,2,0,0,
0,0,2,1,0,1,1,1,1
2510 DATA 2,0,2,0,0,0,0,2,1,0,1,1,1,
1,2,0,2,0,0,2,0,2,1
2520 DATA 0,1,1,1,1,2,0,2,0,2,1,0,2,
1,0,1,1,1,1,2,0,2,1
2530 DATA 1,1,1,2,2,0,1,1,1,1,2,0,2,
2,2,2,2,2,2,1,1,1,1
2540 DATA 1,1,1,1,1,1,1,1,1,1,0,1,1,
0,2,0,2,2,2,0,2,2,2
2550 DATA 2,0,2,0,2,1,2,1,1,1,1,1,1,
1,2,2,1,2,2,1,2,0
2560 DATA 2,2,0,2,2,0,1,1,2,2,2,1,2,
0,2,1,2,1,2,0,1,1,1
2570 DATA 2,2,2,2,0,2,2,1,2,2,0,1,2,
0,2,2,1,1,0,1,1,1,1
2580 DATA 1,0,1,2,0,2,2,0,2,1,2,2,0,
2,2,1,1,2,0,2,2,0,2
2590 DATA 2,2,2,2,2,2,2,2,2,0,2,2,0,
2,1,1,1,1,1,1,1,1,2
2600 DATA 0,2,2,0,2,1,1,1,0,1,1,1,1,
2,0,2,2,0,2,2,1,1
2610 DATA 0,1,1,1,2,2,0,2,2,0,2,2,1,
1,0,1,1,2,2,2,0,2,1
2620 DATA 0,1,2,1,1,0,1,1,2,2,1,0,1,
0,1,0,2,1,1,0,1,2,2
2630 DATA 2,0,1,0,0,2,0,1,0,0,0,1,2,
1,1,0,2
```

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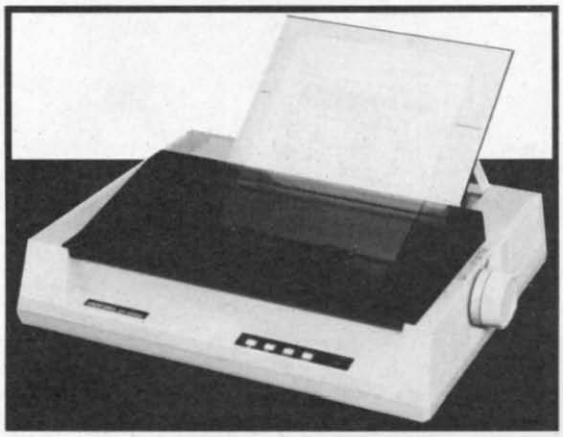

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From Page 76

Program I

```
  10 REM TUBEOFF and TUBEON
  20 REM by Graham Bell
  30 REM for BBC+6502 2nd Processor
  40 REM (C) The Micro User
  50 :
  60 osbyte=&FFF4
  70 osargs=&FFDA
  80 tubechip=&FEE0
  90 thsloop=&32
 100 table=&A8
 110 DIMcode&FF
 120 :
 130 REM *** TUBEOFF ***
 140 PROCclear(code)
 150 FORpass=0TO3STEP3
 160 P%=code
 170 :
 180 [
 190 OPT pass
 200 LDA #&FC     \get current langu
age
 210 LDX #&00          \rom number i
n X
 220 LDY #&FF
 230 JSR osbyte
 240 TXA
 250 BPL start  \branch if number va
lid
 260 BRK
 270 OPT FNequb(&7D)
 280 OPT FNequs("No language in host
")
 290 BRK
 300 :
 310 .start
 320 PHA
 330 LDA #&EA \reset tube presence f
lag
 340 LDX #&00
 350 LDY #&00
 360 JSR osbyte
 370 LDA #&00 \get filing system num
ber
 380 LDX #table
 390 LDY #&00
 400 JSR osargs
 410 TAY      \initialise filing sys
tem
 420 LDA #&8F
 430 LDX #&12
 440 JSR osbyte
 450 PLA
 460 TAX
 470 LDA #&8E   \enter current langu
age
 480 LDY #&00
 490 JSR osbyte
 500 ]
 510 :
 520 NEXT
 530 PRINT''
 540 IFFNsum(code)<>&217BTHENPRINT"C
ode error in TUBEOFF":END
 550 PROCoscli("save TUBEOFF "+STR$~
code+" +100 FFFF2F00 FFFF2F00")
 560 :
 570 REM *** TUBEON ***
 580 PROCclear(code)
 590 FORpass=0TO3STEP3
 600 P%=code
 610 :
 620 [
 630 OPT pass
 640 LDA #&01
 650 BIT tubechip+0
 660 BNE expfnt         \branch if T
ube
 670 BRK              \hardware pres
ent
 680 OPT FNequb(&7E)
 690 OPT FNequs("No Tube connected")
 700 BRK
 710 :
 720 .expfnt
 730 LDA #&14             \explode f
ont
 740 LDX #&06
 750 LDY #&00
 760 JSR osbyte
 770 LDA #&EA   \set Tube presence f
lag
 780 LDX #&FF
 790 LDY #&00
 800 JSR osbyte
 810 LDA #&8F \Tube main initialisat
ion
 820 LDX #&FF
 830 LDY #&00
 840 JSR osbyte
 850 LDX #&FE \Tube post initialisat
ion
 860 LDY #&00
 870 JSR osbyte
 880 LDA #&00 \get filing system num
ber
 890 LDX #table
 900 LDY #&00
 910 JSR osargs
 920 TAY      \initialise filing sys
tem
 930 LDA #&8F
 940 LDX #&12
 950 JSR osbyte
 960 :
 970 LDA #&7F  \write to Tube to sig
nal
 980 .wait        \end of OSCLI rout
ine
 990 BIT tubechip+2
1000 BVC wait
1010 STA tubechip+3
1020 JMP thsloop \go to Tube poll lo
op
1030 ]
1040 :
1050 NEXT
1060 PRINT''
1070 IFFNsum(code)<>&2ED2THENPRINT"C
ode error in TUBEON":END
1080 PROCoscli("save TUBEON "+STR$~c
ode+" +100 FFFF2F00 FFFF2F00")
1090 END
1100 :
1110 DEF PROCclear(memory)
1120 LOCALa%
1130 FORa%=0TO&FF
1140 a%?memory=0
1150 NEXT
1160 ENDPROC
1170 :
1180 DEF FNsum(memory)
1190 LOCALa%,b%
1200 a%=0
1210 FORb%=0TO&FF
1220 a%=a%+b%?memory
1230 NEXT
1240 =a%
1250 :
1260 DEF FNequb(byte)
1270 ?P%=byte
1280 P%=P%+1
1290 =pass
1300 :
1310 DEF FNequs(string$)
1320 $P%=string$
1330 P%=P%+LENstring$
1340 =pass
1350 :
1360 DEF PROCoscli(string$)
1370 LOCALX%,Y%
1380 DIMX%&FF
1390 Y%=X%DIV256
1400 $X%=string$
1410 CALL&FFF7
1420 ENDPROC
```

Program II

```
 970 BRK
 980 OPT FNequb(&7F)
 990 OPT FNequs("Tube on")
1000 BRK
1010 \ delete
1020 \ delete
```

This listing is included in this month's cassette tape offer. See order form on Page 139.

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Scrolling screen can be a problem

I AM trying to write a game based on the London Underground, but I am having problems with the screen display.

What I would like to do is to be able to scroll a section in the centre of the screen so that the player could scan across the whole map without it being displayed all in one go, but leave the rest of the screen in the original position.

I know that the whole screen can be scrolled by changing registers 12 and 13 in the CRTC, but is it possible to make only part of the screen move, and if so, how is it done?

I have tried to use a machine code program to move the memory about, but it was very slow and very jerky, which is not really much use. Is it possible to scroll part of the screen smoothly, or am I asking the impossible?

Also how do you make the computer change screen mode half-way down the screen, as in Elite. I have tried using events with VDU22 in machine code, but without any success. – **J.C. Bullock, Wellington, Shropshire.**

● We're afraid you'll have to resort to software scrolling if you want to scroll a section of the screen display.

As you stated, the 6845 CRTC can only be made to shift the entire screen, not a particular area.

Elite achieves its split screen display by clever interrupts involving the timers present in the 6522 VIA.

At the start of frame flyback a timer is loaded with a value which is then automatically decremented by the VIA until it reaches zero. At this point an interrupt is generated and a special "change mode" subroutine is called.

This accesses the video ULA and 6845 directly and pokes in the new values for the second mode. In addition the palette must be set up according to the mode of the lower section of the screen.

After all this has been done the interrupt routine is exited and when the next frame interrupt occurs the first screen mode is set up again.

As you can see, this is fairly complicated. If you want to see an example of using the VIA timers take a look at page 51 of the October 1984 *Micro User*.

Tipaka tip

I'M having problems with Tipaka from your February 1986 issue. The game is great to play, but when I get to level 3 and get caught by the ghost when in possession of the key the program crashes with the error message Subscript out of range.

I typed the program in from scratch, so I'm prepared to accept that I may have made a typing mistake somewhere, but I've checked my listing over and over again and can't find any difference between it and the published one. – **David Kerr, Solihull, Birmingham.**

● Thanks for informing us about this one. It turns out that under the circumstances you have mentioned the program does generate the error you say. If you add the following line all will be well:

```
15001 LOCAL I%
```

Music System

IN the March 1986 issue of The Micro User *you solved a problem regarding the Music System on page 57. However this problem only occurred in the old version of the Music System, which did talk to the 8271 disc control chip directly.*

This old version is no longer supplied, and the new double density version, which has the number 031064 in the bottom right hand corner of the copyright screen, does not have this problem.

For anybody who has an old version of the Music System disc 1, System will exchange it for the new double density version, for 65p which covers post and packaging. Only the disc is to be returned – no packaging. – **Sarah Reynolds, marketing assistant, System, 12 Collegiate Crescent, Sheffield S10 2BA.**

Win a tenner

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY. Writers of the three most interesting letters will each receive a £10 prize.*

B games on the B+

WITH regard to Darren Polder's letter in the March 1986 issue of The Micro User, *it is possible to run some games designed for the BBC B on the 64k BBC+.*

Many games load in a series of short sections. The first section can usually be loaded and listed.

It will probably consist of routines that print the title page, set PAGE and so on.

With games such as Elite this section incorporates a self-checking mechanism to ensure the machine is fitted with OS 1.2.

Elite does this by testing the value returned by INKEY–256. If this value is equal to –1 the program will continue, or the appropriate error message will be displayed.

By simply typing GOTO 80 this self check is bypassed and Elite will load and run as normal.

Seventh Star uses a similar routine (and probably most other Acornsoft packages) as well as many other games.

By deleting and altering variables many can be made to load.

*This, however, is not true of purely machine code programs – these are easily spotted as the inlay will instruct you to type "*RUN"".*

Also most software checks to see if PAGE=&E00. Typing PAGE=&E00 before loading might help. – **Vaughan Marks, Swinton, Mexborough.**

Mouse trap

PERHAPS I could warn fellow readers about an annoying feature in the AMX Mouse. Although it claims to be Aries RAM card compatible, this only refers to the older B20 board and not to the B32.

Attempting to use the AMX Super Art ROM with the B32 provides hours of entertainment for flatmates of the poor BBC Micro owner, but alas little in the way of amusement for the owner himself.

Fortunately I'd bought the offending Mouse from NSC Computers in Manchester, and their truly excellent service has

From Page 117

cleared the matter up satisfactorily.

Apparently, a version of the Super Art ROM which is compatible with the B32 will be released in a couple of months' time. So all I've got to do is wait.

Finally, how come only one Bob got invited to mess up Acorn's new Masterpiece (pun intended)? I think that I could probably do at least as well. – **Bob Wears, Manchester.**

● While on the subject of the AMX Mouse, AMS tell us that owners of Solidisk DFS 2.1 and Opus DFS 3.45 are having problems using Pagemaker.

Whenever they come to initialise a new page disc everything goes wrong. This is due to missing/different OSWORD &7F calls which are used to talk to the disc controller chip. Anyone who has been having problems with the Opus 3.45 should contact Slogger Software for more information.

Solidisc are also said to be working on a Pagemaker-compatible version of their DFS.

Finding Pro-Word

IN the February 1986 edition of The Micro User *Jim Notman reviewed Pro-Word. I would be grateful if you could tell me the full name and address of the distributor/producer of this ROM.* – **M.J.L. Enoch, Formby, Liverpool.**

● You can obtain ProWord from T. Hall, 31 Wetherfield Road, Noctorum, Wirral, Cheshire.

Verifying Verify

I KEYED in the Fast Verify program from the February 1986 issue of The Micro User, *and it worked OK. However if the Break key is accidentally pressed before a program is saved this program still prints VERIFIED.*

I find this is an easy way to lose a program, so I added some extra code to the program as listed so that a suitable error message is printed.

This works by checking if TOP is two bytes higher than PAGE.

With this modification, the checksum B% equals 34912.

```
251 LDA top
252 CMP #2
253 BEQ bad
254 JMP start
255 .bad
256 LDA top+1
257 CMP page
258 BNE start
259 LDX #40:JMP print
260 .start:LDA #0
1840 $(P%+40)=CHR$131+"You
pressed break!"
1845 P%=P%+60
```

To save code use:

```
*SAVE V 900+170
```

– **H.M. Hoffman, London E9.**

WE were pleased to see the detailed review of our latest program, Yes Chancellor.

Could we correct one point? Your reviewer mentioned that the documentation was "rather grubby photocopied sheets". In fact when we sent you a copy for review, the printing was not completed – hence the finger marks.

The professionally printed 12 page booklet is, we think, a big improvement. – **David Baldwin, Joint Managing Director, Chalksoft.**

● Unfortunately there was no mention on the review copy that the instruction book was a stop gap one. The new one is definitely an improvement, neat, easy to read – and absolutely devoid of finger marks.

£10 Prize letter

Far-from-Masterly documentation

I HAVE recently taken delivery of a Master Series 128. I bought one because of the very good service I received from my BBC B over some years. I must say, however, that I am most disappointed with the overall package, or rather lack of it, presented with the Master.

The documentation supplied could hardly be described as adequate even for the user who only wants to write a few letters and then save them to disc, let alone the enthusiast who actually wants to utilise the features of the machine which he has just received.

The welcome manual could hardly be less welcoming. The introduction is the disclaimer saying "Here's what we could throw together, if you want any more you'll have to buy it".

Would you buy a car from a manufacturer who gives you a free diagram of the car showing only the steering wheel and where to put the petrol in and who then gives the same message as above? I think not.

I have been told by various Acorn agents that the manuals are not yet available and that when they are they will cost some £10 each, not to mention the extra for the View and Viewsheet guides.

Am I going to have to spend another £30 to £40 just to find out the accurate syntax of various commands, how to use the terminal software and how to get the best out of the ADFS?

I realise that Acorn is short of money and is trying very hard to retrieve its position in the UK market, but this is no way to go about it.

I therefore urge that all users of the Master Series write to Acorn and demand documentation that will allow the use of all the features of the machine that they have just spent nearly £500 on.

Can you at Micro User *help us? On a happy note, thank you* Micro User *for the fine magazine during the last years.* – **J.R.A. Macrae, Sleaford, Lincs.**

● You are quite right, the documentation is very poor. We've just obtained the reference manual (Part Two) which gives a lot more detail about the Master, including Edit, Terminal and Basic.

However good documentation for the Master's firmware should have been included in the first place. Let's hope Acorn supplies suitable manuals in the future.

Frustrating Juki

AS a regular Juki user I recognise Peter Drake's frustrations (Micromail March 1986) and your somewhat simplistic answer.

It is, of course, most annoying that Juki appear not to give the support to their many users that such a popular work-horse should justify, and that after several years there still appears to be no Juki users' support club in this country.

In response to Peter Drake's enquiry, the problem needs to be understood more clearly. The use of a temporary indent – or "outdent" in this case – requires that the first line of the main body of the text is undisturbed, which can be done by adding spaces or pad-characters if in justified mode.

However for Juki users who may more often than not prefer proportional spacing, this becomes impossible, and for that matter we recognise how conveniently the issue was sidestepped by not using a computer printout in your example.

In Mr Drake's case, having obtained the right spacings for Richard, what happens for Fred or Bill?

My own solution, forced upon

me by having to tabulate a 'contents and page numbers' list in proportional spacing, produces a satisfactory result every time. Quite simply, the outdented line Richard is printed, then a negative line-feed (OC27,68,0) is inserted before the main text rolls up and prints in the correct position:

RICHARD: Now is the winter of our discontent made summer . . .

FRED: Yeah! That might be OK for you, but I like the snow!

While writing, perhaps Juki users in particular may be interested to note the excellent presentation obtained in PS mode using microspacing in order to obtain right-justified text.

This suite of programs developed by New Horizon produces an excellent standard of copy for journals, magazines and school brochures. I use it all the time. – **Ray Tolley, Chessington, Surrey.**

Ample in Holland

RECENTLY I heard that Micro User *has the intention of publishing a series of articles on Ample and the Music 500 and in the January issue I even read that you offer the Acorn Music 500 at a bargain price.*

I conclude from this that you are interested in Ample and everything associated with it.

So you may like to hear that a few people in Holland founded an Ample User Group.

Last month two members won a contest from Dutch Television. The task was to write a computer program that should play the leader tune of a consumer program.

Out of more than 70 programs submitted Ample won the first prize.

Readers of Micro User *are welcome to join the Ample User Group Holland and if you want to know more about it send a large international SAE to this address.* – **Ample User Group Holland, Karperdaal 58, 2553 PJ Den Haag, Holland.**

● We have one or two ideas regarding Music 500, but no final decisions have been made yet.

McBase mod

I AM having some difficulties with your superb McBase program from the December 1985 issue of The Micro User. *Because it was so long I bought your cassette with the listing on, so I know the problem is not of my doing. It's a shame because it is just what I needed.*

Everything works fine until I come to save a file or load a previously saved DATA file back into the program. Once I enter the filename there are no block messages to confirm saving or loading is taking place and this is rather disconcerting.

Can you tell me whether this is correct or perhaps give me some modifications to help? – **Nicholas Murry, Luton, Beds.**

● Unfortunately McBase, originally written for discs, was modified at the last minute so that cassette users could benefit from it.

The points you mention were overlooked, but if you use the following alterations and insertions all will be well. Disc users are not affected.

Delete lines 2400, 2420, 2430, 2440, 2460, 2470, 2640 and 2670 and add:

```
55 *OPT 1,1
```

Change lines 2450, 2630 and 2650 to:

```
2450 IF LEN(fsp$)>10 THEN
VDU7:GOTO 2360
2630 fsp$=file$
2650 IF LEN(fsp$)>10 THEN
VDU7:GOTO 2600
```

Basic I bug

SOME time ago I bought the disc version of the games and other listings contained in the June 1985 Micro User.

I was particularly interested in the Activities listing and its possible application and adaptation for English and foreign language teaching.

Upon receipt of the disc I found that the program refused to work. I returned the disc, was sent a replacement which exhibited the same fault, and subsequently asked for and received a completely different disc with listings from a later issue.

Since then I have typed the program in myself and am still unable to get it to work properly.

I get a response either right or wrong, the first time I hit a number from 1 to 6, but after that the program is at a complete standstill and will not respond to any key.

If F is pressed right at the start then one can go on pressing F right through the series of pictures but again no response is obtained if one tried the numbers. I have a BBC B with Basic I and an Acorn DNFS 1.2

Why does the Activities program not work as it should? – **E. Thiem, Leicester.**

● The problem arises because of a bug in Basic I when using INSTR within a procedure.

These modifications will cure it. Create the following procedure:

```
541 REM BASIC I FIX
542 DEF FNinstr(a$,b$):LO
CAL x%,r%:r%=FALSE:IF LEN a
$=0 =r%
543 FOR x%=1 TO LEN(a$):I
F MID$(a$,x%,1)=b$ r%=TRUE
544 NEXT
545 =r%
```

then change line 560 to:

```
560 DEFPROCNOCH:ANS%=VAL(
AN$)-1:IF NOT FNinstr(KP$,A
N$) KP$=KP$+AN$
```

Basic analyser

MAY I bring to your readers' attention the solution to two problems which some people have had with the Basic

TEN TIPS FOR CITADEL

£10 Prize letter

I CANNOT praise Superior Software's Citadel highly enough. I tried and tried to finish it, but I couldn't even get past the wolf monster. Eventually I resorted to cheating.

For the honest ones among us, here are some tips to complement those given in the March issue.

● *To kill the hooded beasts fire a spell into their eyes.*

● *To kill the witch take the skull (at west tower), the pink object (at east tower) and the cyan object (in pyramid) all to the witch's cauldron, one by one. Once delivered, allow the witch to fly towards you, and presto! she fizzles.*

● *To enter the pyramid, climb its right hand side level with the top snake, walk left and work your way down.*

● *To disable the blue men in the pyramid place the Egyptian masks in the rooms required. The masks are at the bottom of the well and in the east wing.*

● *To collect the crystal in the coffin in the pyramid take the green statue on the east side of the island and walk over the coffin.*

● *To get past the brick wall in the lab load the cannon in front of it with the cannonball (in mountains) and the gunpowder (a pink bag in the west wing).*

● *To finish the game the three crowns are not needed unless you don't want to get 99 points.*

● *To destroy the starport, your ultimate aim, collect the jewel in the palace on the other planet and return to Earth.*

● *If you want a laugh go to the island, and where you find the green statue (east side) put a trampoline down and jump as high as you can and see what happens.*

● *To freeze water collect the ice crystal from the cellar. All water will freeze while you have it.*

Remember there are eight keys, including the one on the planet, three crowns, 10 energy flasks and five crystals to collect. – **Michael Spalter, London NW7.**

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Analyser (October-December 1985 issues of The Micro User).

*The first problem affects users with Basic I, who may have had problems with No Room errors. If you do not know which version of Basic you have, type *BASIC then REPORT – if the copyright message says 1981, you have Basic I. Basic I users should modify line 110 to read:*

```
110 h$="          ":q$=h$+h$:z
$=q$:a$=q$+q$:n$=a$
```

This will set aside five spaces for h$, 10 spaces for q$ and z$, and 20 spaces for a$ and n$.

This is done because Basic I is very inefficient in the way that it allocates string storage space if a string grows in length, and can thus lead to a No Room error if there is insufficient space set aside for the major strings at the start.

It is unlikely that these strings will end up longer than this. If a No Room error still occurs, more working space for Basic can be set aside by modifying line 130 to read:

```
130 ...:HIMEM=TOP+&A00:..
..
```

The second problem occurs with some cassette players, which do not have any motor control, or are sluggish in their response to the motor control from the computer.

Either way, the tape can move on too far for the slow rate at which the analyser program wishes to read it in. Thus when the program wants to read in the second block on the tape the tape is already physically positioned beyond the second block.

For this I can suggest two solutions. The first is to use a different cassette player which has motor control and a quick stopping/starting response time.

Alternatively load the program to be analysed, and then resave it with a longer gap between the blocks.

If your cassette player does not have motor control this will also give you more time in which to switch off the player whenever the cassette motor light goes off.

To save the program with a longer inter-block gap, you need to load the program, then type in the following (having put in a blank tape):

```
I%=OPENOUT "program":FOR J%
=PAGE TO TOP:BPUT #I%,?J%:N
EXT:CLOSE #I%
```

This will resave the program using an interblock gap of 2.5 seconds, not the standard 0.6 used by SAVE.

*If you wish to change this revised interblock size, you can do so by *OPT3,... (see the User Guide page 398 for details).* – **Mike Stallybrass, Stourport-on-Severn, Worcs.**

Karate v micro

THANK you for the game Karate in the October 1985 issue of The Micro User.

Below is a listing of the extra lines required to change this game so that it is for one player against the computer:

```
 95 A=RND(4)
 100 IF A=1 AND E%=0 THEN
PROCkick1
 120 IF A=2 AND E%=0 THEN
PROChikick1
 140 IF A=3 AND E%=0 THEN
PROCsweep1
 160 IF A=4 AND E%=0 THEN
PROCsom1
 300 GOTO 95
```

You control the man on the right. Keep up the excellent standards of your magazine and of its listings. – **Shameel Sanoon, Warrington.**

Character set

I BELIEVE that a word processor program capable of generating international symbols driven by a BBC Micro could be of considerable assistance to me in the study of the French and the German languages and literature.

During the past two months in the search for such programs I have spent a great deal of money on telephone calls and postage and expended a good deal of nervous energy, but all to no avail. I have not found any.

A computer innocent, it was with considerable joy I saw the display of the master character set on page 72 of your March issue. There they were, the grave accent, the acute, the circumflex, the cedilla, the umlaut – but how to get them out to a monitor, to a printer?

No doubt if I were a computer expert I could write programs to give me the solution I seek, but I do not have the time for or the inclination towards programming. My interest lies with the languages and it is to those I want to devote my time. Do such word processor programs exist?

So far as printers are concerned, my preference is for a daisywheel machine, but I accept that a dot matrix printer might be obligatory. – **R.A.O.J. Hayward, Tuffley, Gloucester.**

● We're afraid we cannot recall any word processor package capable of doing what you want. Perhaps readers have some ideas?

Elite status

FOLLOWING the letter in March's Micro User *from Commander Antaeus we feel there are one or two things that need clearing up.*

We are both true Elite commanders and very proud of this. Just because some guy has a disc or tape saying – ELITE – it doesn't mean he is.

I (Lee) was the first to reach Elite status in our area, some months before friends, but at the beginning of the year I took my disc collection into college in the morning, and by the end of the day there were five new Elite commanders in the college.

*Elite Cheat – which, by the way, we didn't write – is just an extension of the DFS *COPY command, and is meaningless to those of us who are true Elites.*

A real Elite commander could blow a Thargon invasion fleet to bits with a pulse laser, but a phoney would be pulverised in seconds.

So, as we said in the guide, Elite is not just a status file, it is knowing you are truly Elite and that you can trade anything and kill anyone you like.

And to all those space commanders out there – we don't mind you playing with Elite status, but you cannot claim to be Elite.

On to other things. As far as we know there are only two missions, and we found the Ctrl + X weevil months ago even before it was printed in Squirrel User. – **Commander Lee Varga (Elite), Commander Clive Packer (Elite), Wellingborough, Northants.**

Rev lasers?

WITH reference to your article in your March issue by Revmasters Varga and Packer, I would like to point out that just because they find wing settings 25 and 16 the best this does not mean that they are the optimum ones.

I would also like to point out that the chicane can be taken at full power in fifth gear instead of fourth.

So rather than tell readers how they get around the track why don't they just state their best time and let the rest of us try to beat it (assuming it is a good lap time)?

On the subject of Elite, I and other members of the order are fed up with your attempts to help lower ratings attain the status of Elite by cheating.

The whole point of buying a game program is to enjoy it, so rather than think up ways of cheating why don't you keep your cheat programs to yourselves?

I suppose in a couple of months time you'll have a Revs cheat program that can let everyone else's tyres down and fit the car with military lasers. Do us all a favour and keep it to yourself. – **M.S. Carpenter, Coventry.**

● There seems little point in publishing lap times. Your comments on Elite just go to prove the maxim that "you can please all the people some of the time, and some people all the time but..."

Thanks for the suggestion about the tyres. We're working on a cheat for Revs and hadn't thought of that one.

Line feed command

I RECENTLY bought a Brother M-1009 dot matrix printer and

found myself unable to print graphics with the DIP switches set to line feed.

Could you please tell me if there is a command to turn off line feed? – **Colin Targett, Marden, Hereford.**

● You can set the DIP switches on the printer so that it doesn't produce line feeds. This will enable graphics to be printed.

For normal text files from word processors and for listings enter:

```
*FX6
```

This tells the BBC Micro to send its own line feeds to the printer.

Line lengths

I WAS recently asked to produce a listing of a Basic program, but the maximum width of each line of the listing was not to be more than about 13cm.

Since I use an Epson FX80 printer this is clearly possible, but how could it be done?

An investigation of the printer operation manual showed that ESC Q would do the trick.

Since I wanted to get as much text as possible on one line I turned on the condensed mode of the printer using:

```
VDU 1,15
```

and included it with the page width command as follows:

```
VDU 1,15,1,27,1,81,1,86
```

The:

```
VDU 1,27,1,81
```

command is equivalent to ESC Q, and:

```
VDU 1,86
```

gives the column width of the page, 86 in this case.

You simply alter the length of the printed line by changing the final number. – **Noel M. Morris, Stoke-on-Trent, Staffs.**

Make a splash

CAN you ask other readers whether they know of a "splash" sound and/or envelope.

I have every copy of The Micro User *but I cannot find the answer to this in any of them.* – **J.F. Truscott, Luton, Beds.**

● Once again it's over to our readers. You haven't let us down yet.

Good for business

CONGRATULATIONS on dedicating a section of your magazine to the business user. There is a large and growing usage of the BBC Micro in this environment and the good no nonsense approach adopted by Jo Stork is welcome.

In particular I thank him for his complimentary review of our Bank Manager in the April issue.

However I would like to correct the impression left, albeit unintentionally, that pressing Break leaves the files in a shambles.

Breaking while the program is updating the disc can leave a partially updated record and a broken link. This is recognised by the system as soon as you start up again and you are offered the option of running the very comprehensive RECOVERY module to restore your data.

Although I would always advocate a backup routine against possible file loss I have yet to find anything but a physically damaged file that cannot be recovered using this option.

The Break key was left unprotected as no absolute foolproof method exists to guarantee file integrity in every situation on all BBC configurations.

Instead the RECOVERY route was chosen as it provides the best method of protecting the user's valuable data, even if some other program chooses to "scribble" over the data file, the minimum data loss possible will occur.

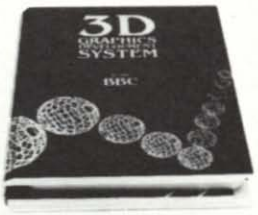
Finally Jo lists just some of the many facilities provided and asks "who needs them all?". The answer is probably no one, but everyone needs some of them and the needs vary, so all are used extensively.

For too long software houses have been supplying the least possible for the highest cost. Help us, Jo, to give the user a fair deal and good, truly comprehensive systems.

The serious BBC user knows what he or she needs from the system and is not easily satisfied with less. – **Ian A. Whiting, Partner, Contex Computing.**

3D GRAPHICS
DEVELOPMENT SYSTEM

Simply the most sophisticated 3D Design and Animation System for the BBC micro, for the amazing price of only £25 including VAT.

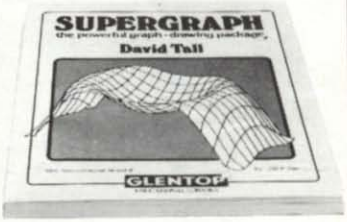


A complete Development System which provides a sophisticated design tool for creating any 3D object. Includes a unique high performance 'Real-time' Applications system allowing you to produce stunning animation of designs in your own Basic or Assembler programs. The system is ideal for 3D CAD and is an excellent educational tool for visualising molecular structures and 3D geometry. Simulations and Elite-type games are also easily produced.

The whole package comes complete on two discs (40 or 80 track) with a comprehensive 96 page manual.

SUPERGRAPH

Supergraph is the most powerful, yet easy-to-use, set of function plotting programs available for the BBC micro at only £28.85 including VAT.



The standard routines are suitable for young children meeting coordinates and graphs for the first time, while the more subtle facilities are appropriate for Advanced through to University level.

The disc includes:

- Supergraph - the main graph drawing program
- Super-Zoom with extra facilities including a 'zoom' option
- Superprint - a screen-dump for Epson compatible printers
- A series of demonstrations and a disc back-up facility.

The package, supplied with a 40 or 80 track disc, comes complete with a clear and comprehensive 144 page manual.

GLENTOP

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"the REPLAY ROM is a remarkable facility".
A.J.P., London.
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"All my tapes have been effortlessly transferred to disc and work well; the pause and update facilities are excellent".
T.G.B., Cheshire.
"Congratulations on a superb product. For my book it's the best utility I've seen for the 'Beeb' ".
C.E., Liverpool.
"we have transferred over 60 cassettes with no problem at all even though we were completely new to disc-drive methods".
W.B., Bolton.
"a marvellous addition to my system".
P.B., Ashford, Kent.
– and to anyone wondering about our service, may we add the following:
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D.H.C., Derby.

REPLAY FACT FILE

REPLAY is a Hardware/ROM-based system, the unit can be easily installed without soldering, though if you have a ROM expansion board Make sure that the REPLAY ROM can be fitted into one of the computer's own sideways ROM sockets.

With REPLAY installed games can be stopped and saved directly to disc at any time.

REPLAY can load back a stopped screen from disc ready for printing out with a suitable 'printer dump' routine.

Liven up your games with REPLAY: Different background colours: Infinite lives: Hyperspeed: Extra gears: Edit the improvements working from the data sheet supplied.

REPLAY can 'pause' games which do not have this facility built-in, and is also able to offer most disc to disc transfer.

The REPLAY System is intended to provide a facility for individual users, resulting discs are not recognised by a different computer. Further details and copies of reviews can be supplied on request.

REPLAY is available for the BBC 'B' with O.S.1.20 and fitted with the following DFSs (State type when ordering).

R8271 Acorn and 8271 S/D. R8272 U.D.M. DFS
R8877 Cumana QFS. R2791 Opus 3.15
R2793 Opus 3.35 R1770C Opus Challenger 3.
R1770 Opus 3.45 and Solidisk (issue 1).
R1770A Acorn 1770 and Solidisk issue 2 interfaces (with ADFS or DFS).
R1770B for BBC 'B+' **£35 inclusive**

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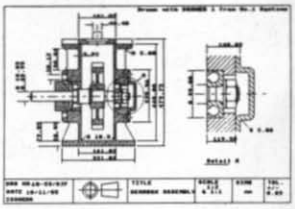

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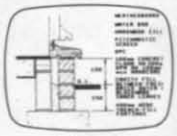

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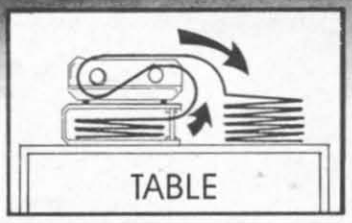

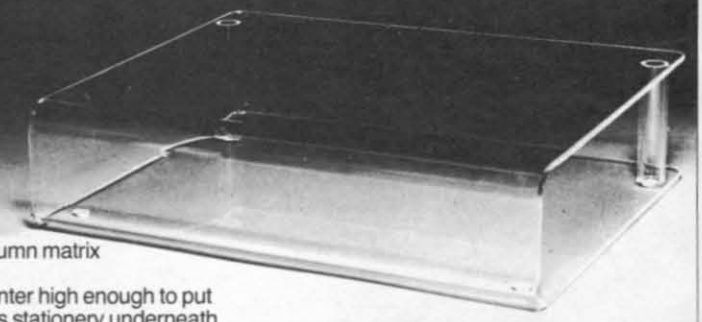

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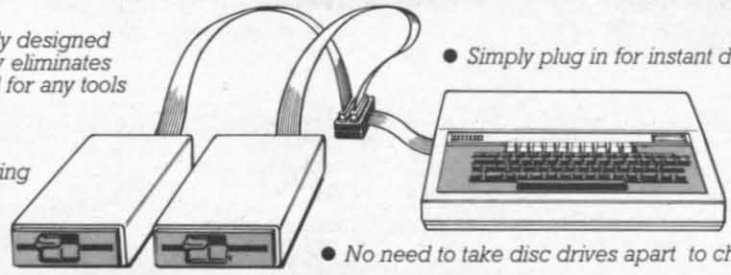

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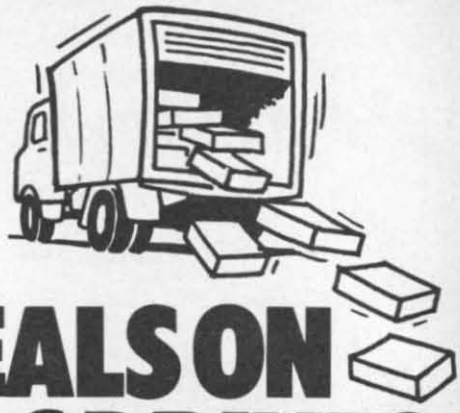

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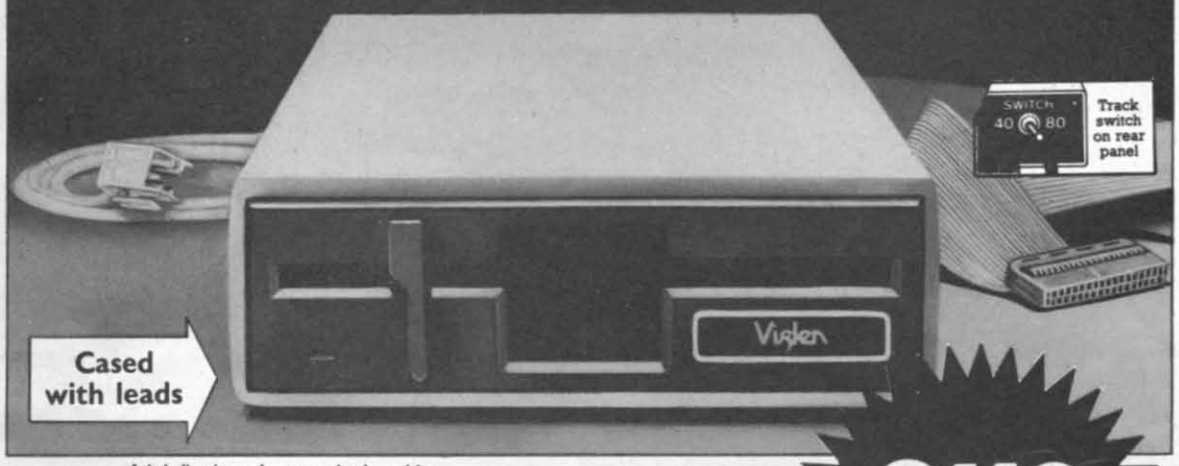

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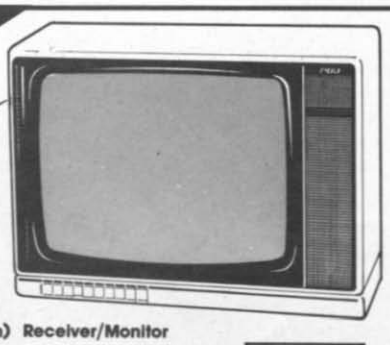

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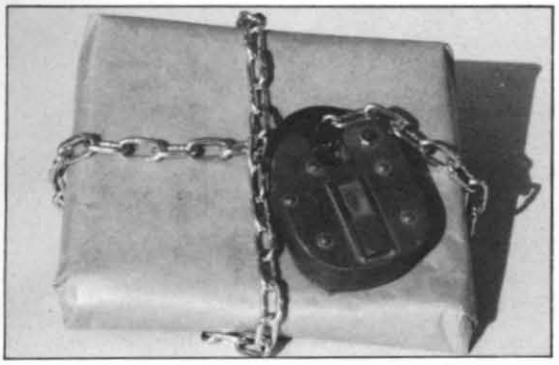

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★ Centre, indent, tab, justify and merge text. ★ Insert, copy, move or delete blocks of text.
★ Select two editing modes: insert or overwrite. ★ Search and replace globally or selectively. ☆ Check typing speed in words per minute. ☆ See on-screen real-time clock, plus word and character count.

With the database you can . . .
★ Select five field types (Alpha, Decimal, Date, Integer, Formula).
★ Perform all arithmetic functions.
★ Search over multiple fields.
★ Mark individual records. ★ Use flexible printout routine. ★ Pass records to the word processor. ☆ Carry out powerful multi-field record sorting.

With the spreadsheet you can . .
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★ **Features that were not in the original Mini Office.**

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming – and at a price everyone could afford.

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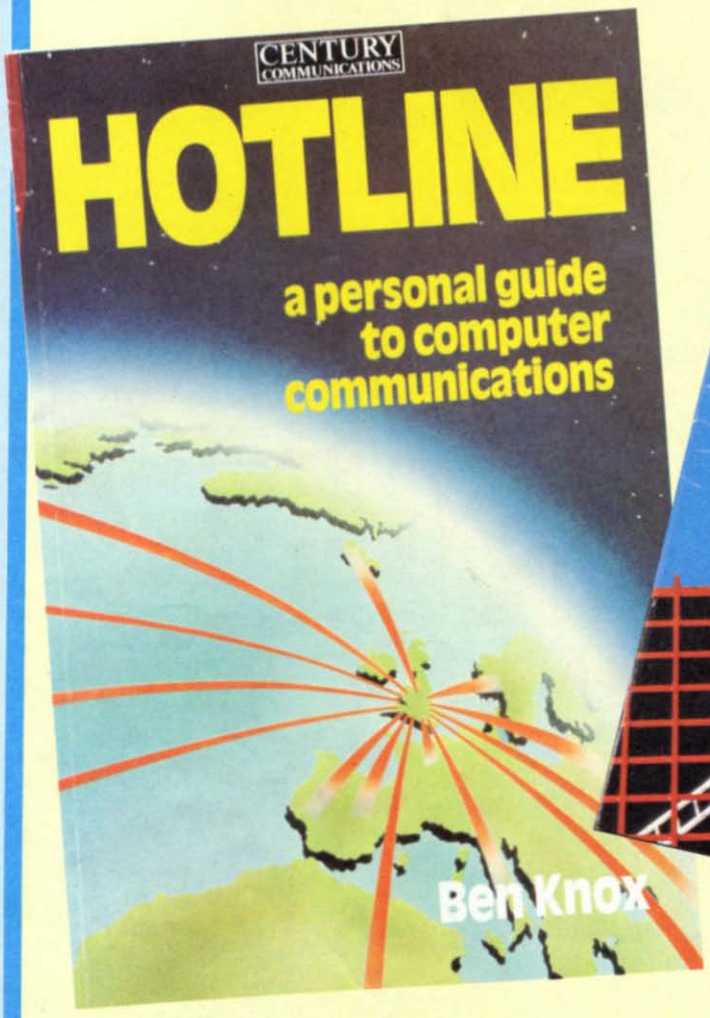

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1

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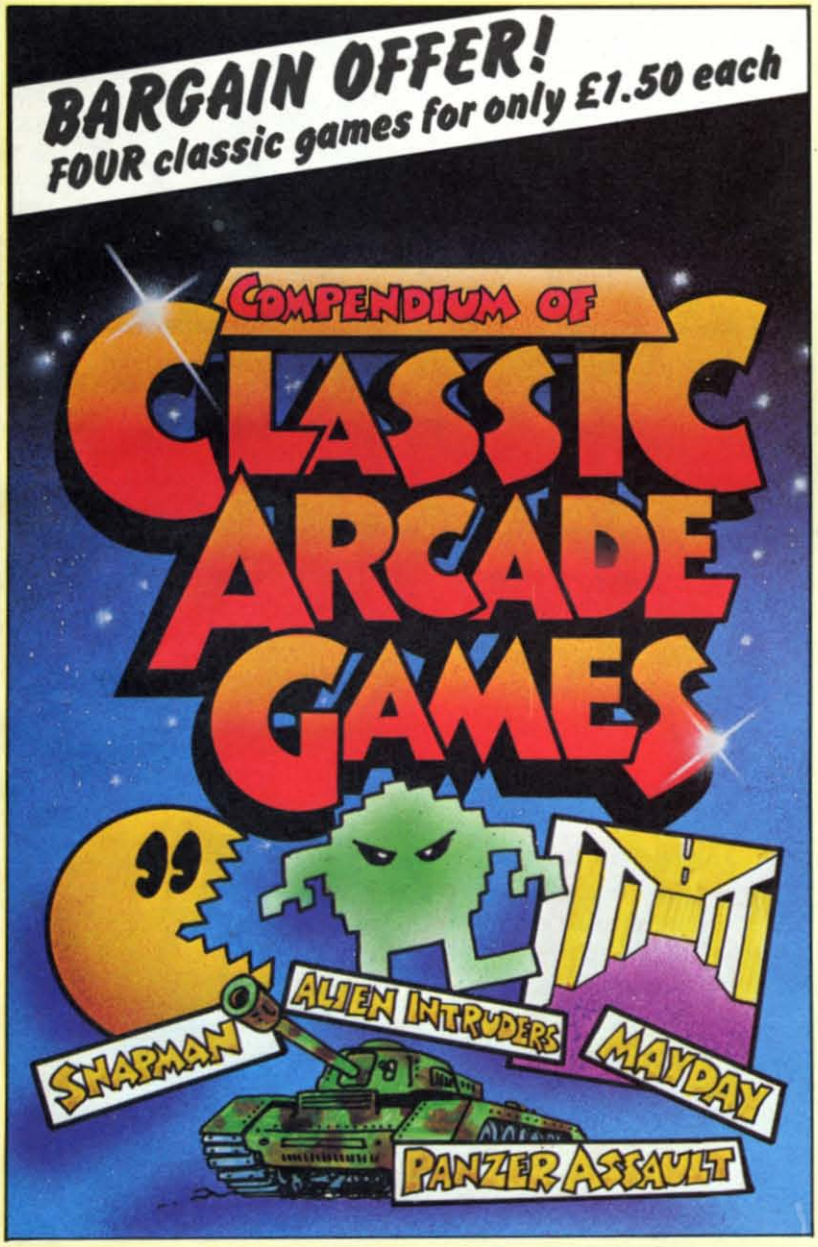

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B+ ✓
M ×

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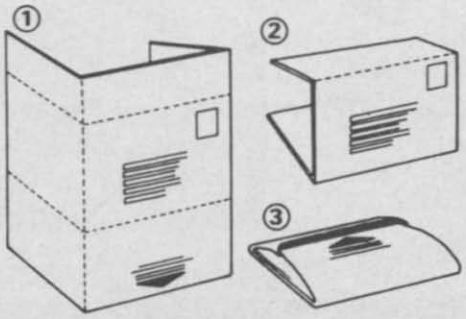

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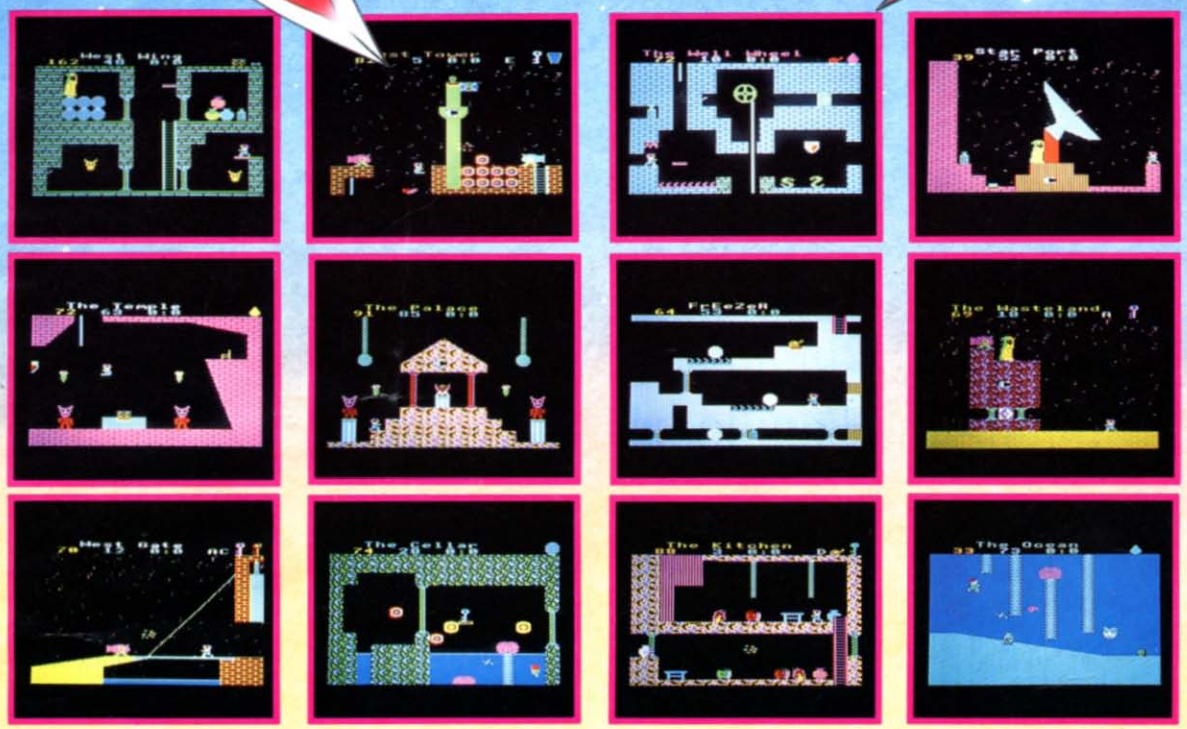

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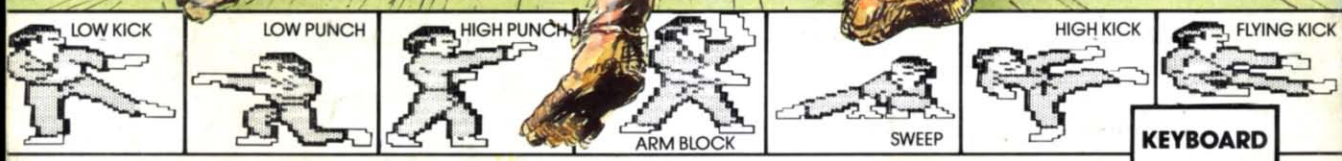

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WORDWISE works with all filing systems such as disc, cassette and the new ADFS. It works with any printer that is compatible with the BBC Micro (most are) and is able to control all the special features of the printer such as underlining, italics etc.

This latest version of WORDWISE has now been improved to include some of the WORDWISE PLUS enhancements such as faster loading/saving and protection against the overwriting of existing files. A variety of new embedded commands now make files totally compatible with WORDWISE PLUS. It works with a wide range of machines and extension shadow RAM systems, such as ARIES or WATFORD boards.

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MAKING OF THE MICRO MILLIONS

Arguably the best known name in the world of Acorn after co-founders Chris Curry and Hermann Hauser is Nazir Jessa. An East African Asian immigrant, he built a business empire based on the BBC Micro – and still uses one to run it. Here MIKE COWLEY takes an in-depth look at the entrepeneur who became a millionaire out of Watford Electronics, despite ruffling a few establishment feathers along the way . . .

THE Nazir Jessa story is not one which would necessarily have a Hollywood producer chomping excitedly on his Havana cigar. Superficially at least it seems a tale of riches to riches.

Yet though it lacks the essential poor boy makes good element, it still contains many of the ingredients of the classic struggle. In fact the scenario has the occasional Dynasty touch about it.

Born into a fabulously wealthy family of Tanzanian traders – not one but two mansions overflowing with servants – the young Nazir's future at first seemed inexorably tied up with the business. Yet after a series of potentially ugly confrontations with immediate members of the Jessa clan – a bullying cousin, a callous uncle – he vowed that one day he'd make it in his own right.

So eventually he turned his back on his inheritance to come to England to train as an optician. But his natural instinct for trading was never far below the surface. It wasn't long before he was operating an electronic components mail order business from a corner of his bedroom in a back street house in Watford.

Like Topsy it grew and grew until Watford Electronics became a recognised giant in the BBC Micro market with its own purpose-built £700,000 headquarters and a turnover of £7 million. And Nazir Jessa has been able to achieve all this without any cooperation – until recent times – from Acorn itself.

For it wasn't until Watford Electronics had sold more than 17,000 BBC Micros that the boys from Cambridge deigned to officially recognise the company's existence by appointing it a distributor. This has not unduly concerned the Watford boss. After all, he accepts he has at times ruffled a few feathers in the cause of business.

Today Nazir Jessa wears all the trappings of the rich with ease. A solid gold Rolex Oyster dangles loosely from his wrist – "I can't find the time to get the bracelet fixed" – his clothes are definitely Saville Row and he's very much at home behind the walnut fascia panel of the two tone Rolls Royce bearing the number plate NPJ 1.

He obviously enjoys the gracious living cherished by his father before him – only he has the satisfaction of knowing it has not been derived from the golden spoon he once so dramatically spat out all those years ago.

Yet there is rarely a day goes by when he does not recall the vitriolic comments of his callous uncle back in Tanzania. Nazir was just 15 years of age and had just failed to successfully complete a deal on behalf of his family at the market, one of few such setbacks in his lifetime.

"We are not businessman are we?" Nazir mimmicks the conversation from so long ago, recalling not only every word but also the way it was spoken. "You haven't got a business brain have you?" The successful businessman winces as the memory comes flooding back.

To say that to a Jessa was to question his honour. For the Jessa name meant flour mills, maize mills, wheat mills, soap, coconut oil and even a giant hardware emporium. Jessa, in fact, meant business in Tanzania. And because of this the family was rich

From Page 3

beyond even the dreams of most people.

With servants to attend their every whim, the life style in the Jessa mansions was pampered in all senses of the word. The act of leaving the table to fetch himself a glass of water resulted in instant chastisement for the young Nazir from his mother. "That's what the servants are for", she told him firmly.

Even when he was older and took one of the family cars out for a spin, it would have been unthinkable of having to repair a puncture himself. Instead the chauffeur would be sent from home to change the wheel in case the young master dirtied his hands.

Yet the Jessa children did not have it all their own way. Because they had been born into a renowned trading family, they were introduced to business at a very early age. While most of his school pals whiled away their afternoons playing cricket, Nazir found himself working from the age of 11 in one or other of the Jessa corporate outposts.

"We were taught that business came first. That is why I was so upset with what my uncle said to me. And I've recalled it so often since. Though it was some years later, it was this more than anything that made me decide to go to England on my own.

"So one Friday I went to my father and told him I intended to go there to finish my education. Come the Monday, I was on my way. It was easy really because of my family name I was just able to go and order an air ticket".

And that was to be the last time that Nazir Jessa was to be financed by his wealthy family. At 21 years of age Nazir suddenly found himself in the England that he'd read so much about in the school books back in Tanzania. The reality was to prove a sobering experience.

"When the porter took my bags at the airport I gave him a shilling", remembers Nazir. "I couldn't believe it when he thanked me about five times. It all seemed so strange because I never thought of an English person doing a menial job like that".

However he soon found "digs" in Muswell Hill and began to train as an optician. After qualifying he worked at University College Hospital before accepting a two year contract in Libya "to get some money saved quickly".

The money he came back with was sufficient not only to buy a small house but there was also £2,500 left over to launch his embryo mail order business selling electrical components.

"Quite honestly when I started I hadn't got a clue. When I ordered transistors, I was expecting something like radios to appear instead of three legged monsters. "But I soon learned".

Learn he did. Monitoring what his competitors were offering in specialist trade magazines, he bought and sold accordingly. Advertising in his own right, he was soon up and running. Continuing with his day job of managing an optician's practice in Watford, he spent two years building up the electrical component firm which was based in one corner of his bedroom. His first recruit was younger brother Raza who is still his right hand man today.

And it wasn't long before the two of them found themselves thrust head first into the BBC Micro market. However, it was the BBC Micro market that had come to Watford rather than the other way around. In the early days, Acorn dealers beat their way to Watford's door to buy printer cables.

"We couldn't get enough of them", says Nazir. "But we had to be careful. For if the man who we were buying them off had realised just who we were selling them too, he would have sold them directly himself".

So the Jessas came up with an idea. They began to buy single ended cable from one source, connectors from another, then fit them together at home. It worked perfectly. They sold 100 a day without either of their suppliers getting a hint of the lucrative market out there. Having realised the potential in the BBC Micro before most, Nazir Jessa began to look at what else was needed.

The next boom area he foresaw was in upgrade kits to convert the Model A into the Model B. So Watford began to market its own kit in direct competition with Acorn. This far from pleased the makers of the BBC Micro as the astute Nazir's kit considerably undercut the price of their own.

It was to prove the start of a turbulent relationship which saw Watford initially dismissed as an irritant, then classified as a social pariah before finally being welcomed into the fold by a more enlightened management team. In the meantime Nazir Jessa simply carried on making money – lots of it.

After the upgrade kits Watford moved swiftly into both software and hardware, seizing every opportunity to capitalise on the demand which had found even Acorn sadly lacking. Such was the company's success that it was forced to move its headquarters from Nazir's house into what had been an off licence next door. This had been precipitated by customers overflowing from the lounge, where orders were taken, down the hall and into a passageway outside.

Things tend to work out well for Nazir Jessa. As the first company to design a ROM board for the BBC Micro Watford found itself inundated with orders – including one from Acorn itself.

The time when Acorn couldn't – or possibly wouldn't – supply him with BBC Micros proved to be only a minor hurdle. He simply went and paid the full price for them at Lasky's – "who couldn't move them anyway" – of £279 including VAT. "Then we resold the lot at our normal price of £289 plus VAT", he says.

Although he insists that money is not his main motivation in business he does seem to have the golden touch. The site of his new headquarters has suddenly found itself across the road from a proposed major development by Tesco's. Almost overnight then the value of Watford Electronic's site has increased twelve fold. "How am I going to be able to spend all that money?" jokes Nazir.

Yet the final accolade for Nazir Jessa turned out to have little to do with money. It was when his 85-year-old father Panju travelled over from Tanzania – where he still lives despite the fact that much of the old Jessa empire has now been nationalised – to give him his blessing. "He told me that he was proud to see I've kept the family tradition and name alive", says Nazir. "And that made everything worthwhile".

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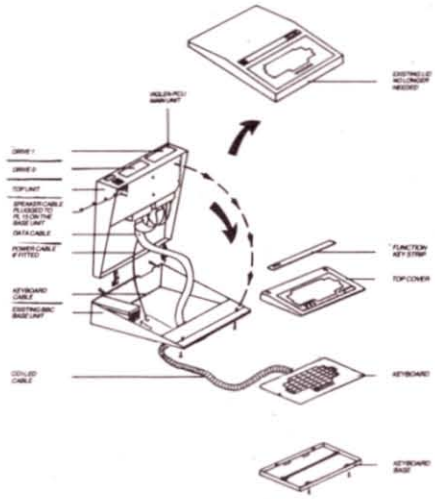

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Spreadsheets made easy

By NIGEL PETERS

SPREADSHEETS are a Good Thing. They must be, there's a lot of them around and some cost a fortune. One of the standard excuses for buying a micro is that they will help with both business and home finances. And spreadsheets are quoted as one of the things that will help them do it. But what are they? How do they work and what use are they? This is the start of a short series designed to answer some of those questions.

Briefly, spreadsheets are used to perform all sorts of business calculations. But, perversely, before we get on to spreadsheets, let's look at how these calculations were done in earlier days. This will, hopefully, give some idea of why spreadsheets are used and a glimpse of what they are used for.

As an example, let's look at the first three months trading of a small company. It could be the Sellafield Leek Company, purveyors of vegetables that glow in the dark, or Loch Garten Osprey Limited selling off the excess fish caught by the birds. Whatever the company they're in it for the profit.

And to calculate the profit you've got to know all sorts of things like how much it costs to make one unit of whatever it is, how much is charged for one unit, how many of them have been sold, and so on. Figure I shows these details for one particular product over three months.

The figures are laid out in tabular form and there's no great mystery as to how they're arrived at. Taking January, when Loch Garten Ospreys must be selling frozen fish, 20 units are sold. Now each of these units cost £10 to the customer (probably salmon) while

	UNIT PRICE	NUMBER SOLD	UNIT COST	TOTAL COST	MONTHLY SALES	MONTHLY PROFIT	YEAR PROFIT
JAN	10	20	8	160	200	40	40
FEB	10	30	8	240	300	60	100
MAR	10	25	9	225	250	25	125

Figure I: Sales, costs and profits

costing the company some £8. From this it's not hard to see how the figures for monthly sales are calculated, you just multiply the number of units sold by their price and you end up with the monthly sales. In January this is 20 times 10 with the result £200.

Similarly the total cost is found by multiplying the number sold by the cost to the company. So the total cost of producing the items sold in January is 8 times 20, or £160. The monthly profit is the money got in from the sales minus the money spent making the sales, a magnificent £40. And this is also the profit to date.

Now have a look at February's figures and see how they fit together. The unit production cost and selling price are the same, but the number sold has increased. This is reflected in the total monthly figures for sales and costs and gives an increased profit of £60. This is duly added to the previous £40 to give a profit so far of £100.

Getting on to March, a glimpse at the figures shows costs have risen and profits for the month have fallen. The company will have to make some decisions.

Leaving this dire financial outlook for the moment, there's one important point about all these calculations. While the figures may have changed, the calculations done with those figures are the same. No matter what the price or the number sold, the monthly sales were found by multiplying them together.

It's the same with the monthly costs and the profit. The figures, and consequently the results, may change but the operations done on them are the same. No matter what the month, the new total profit is found by adding the monthly profit to the total profit of the previous month.

Still studiously ignoring our computer with its spreadsheet program, let's look at how we'd have to do these calculations. Almost certainly we'd get the figures for sales, costs and numbers sold putting them in a tabular form on a piece of paper. The total costs and so on would be left blank for the time being. Figure II shows the idea.

Next out would come the calculator, pencil and eraser and then the hard work. You'd work through the figures column by column, row by row filling in the results from the calculator. And you'd be doing the same job on each month's figures, the figures themselves being the only thing that changes.

That seems simple enough, but in real life it's not. I mean you're never likely to get the nice neat figures I've used. And there are bound to be a lot more columns. What about VAT and overhead costs, depreciation and all the thousand and one things that conspire to make the small businessman's life a misery? Even tall business men suffer.

So our little table of figures would, in reality, be a lot more complicated and a lot larger. In fact there's a tendency to end up with sheets of paper spread

	UNIT PRICE	NUMBER SOLD	UNIT COST	TOTAL COST	MONTHLY SALES	MONTHLY PROFIT	YEAR PROFIT
JAN	10	20	8				
FEB	10	30	8				
MAR	10	25	9				

Figure II: The raw data

everywhere. Worse than that, suppose you made a mistake somewhere. Maybe an inadvertent slip of the finger resulted in your calculator telling you that February's profit is £80 instead of the £60 it really was. Notice that the effect of the mistake isn't limited to that month. It carries over into the accumulated profit figures for March.

And then what if, in March, someone returned some goods sold in January? The figures have to be adjusted, changing the profits. Again it's not just confined to

	1	2	3	4	5	6	7	8
A		Unit price	Number sold	Unit cost	Total cost	Monthly sales	Monthly profit	Year profit
B	Jan	10	20	8				
C	Feb	10	30	8				
D	Mar	10	25	9				

Figure III: Spreadsheet with raw data

From Page 7

January, the effect ripples through the results for the other months.

As you can see, what seems so simple actually becomes a frustrating, time-consuming business using up pencils, paper, calculator batteries and, especially, rubbers – which never seem to be around when you need them.

This is where the spreadsheet comes in. Let's think about what we've been doing in general terms. First of all there's the raw data, the stuff held in Figure II. Then there's the calculations done on this data. In this case they're the same for each row, a repetitive bit of maths. And finally, notice that one of the calculations, the total profit, isn't confined to just the figures in a row, it grabs one from the row above.

Now this is what computers are good at. They're made to handle data, can do repetitive tasks with ease and remember things that they've done previously. And they do it all much faster and more reliably than can humans. All they need is a program to get them to do it – and that program is a spreadsheet.

With a spreadsheet you give the program the raw data, tell it what calculations you want it to do and the computer gets on with it. Figure III shows a simple spreadsheet layout, containing our raw data. The screen has replaced the paper and the keyboard has replaced the pen, rubber and calculator.

You'll notice that the figures are still in tabular form but now they're held in a grid. How we get the grid in the first place and how we get the data into it we'll come to next time. As you can see, the grid is marked with letters for the rows and numbers for the columns. Using these you can refer to any of the boxes or cells in the grid. The number of products sold in February is in C3 while D4 contains the increased price.

Using these cell names we can get the spreadsheet to do our sums for us. For example we find the total cost by multiplying the unit cost by the number sold. To get the spreadsheet to do this for January we tell it to take the number in B4, multiply it by B3 and put the result into B5. This is done by putting the formula B4*B3 into cell B5. This tells the computer where to get the figures from, what to do with them and where to put the result.

Again, don't worry about how that's actually done, we'll come to that later. And if the asterisk worries you, it's just the sign the computer uses for multiplication. Similarly, to get the monthly sales we put the formula B2*B3 into cell B6. In this way we show the spreadsheet what we want it to do. Now at the press of a button it does all the sums for us and puts the results where we want them. No more hammering a calculator!

However it can do a lot more than that. Remember that with our paper and pencil method the calculations were the same for all the other rows, only the data was different. It's the same with the spreadsheet. But with a spreadsheet you don't have to go to the trouble of entering every formula for every month all over again. You can just tell the micro to do what it did on the row above, only with the new figures. So, once you've got the formulae for the first row you've got it cracked. The micro does the rest of the job for you and at the touch of a button the computer does all the calculations and puts the results in the appropriate cells. Figure IV shows the results.

I think you'll agree that it's a lot easier than the pencil and paper method. And you can do a lot more. Mistakes are easy to correct. If you find that only 25 units were sold in February you can just change the 30 in cell C3 to 25, press a button and the program recalculates the lot. The changes ripple through and the correct figures appear.

Also planning is made easier. It's simple to save your spreadsheet to keep your details intact and then mess around with it, seeing what different prices and sales would do to the performance of the company. Spreadsheets can't take your decisions for you but they do allow exploration of alternatives.

And now, having given a brief glimpse of what spreadsheets can do, there comes the question of how to use them. How do you set up the grid and enter the formulae? The answer is, provided you've got a good spreadsheet, easily. However, that comes next month when we'll be exploring spreadsheets in more detail. But be warned. Spreadsheets are fascinating and can be addictive!

	1	2	3	4	5	6	7	8
A		Unit price	Number sold	Unit cost	Total cost	Monthly sales	Monthly profit	Year profit
B	Jan	10	20	8	160	200	40	40
C	Feb	10	30	8	240	300	60	100
D	Mar	10	25	9	225	250	25	125

Figure IV: Spreadsheet with results

WE OFFERED THEM A CHALLENGER–THEY GAVE US BACK A CHAMPION

After testing the new 3 in 1 Challenger disc drive system from Opus Supplies, Britain's three leading BBC micro magazines were clearly impressed. After all Challenger is the fastest disc link-up ever with no complicated interface connections, soldering or track cutting. No wonder this remarkable plug-in disc drive, double-density disc interface and super fast 256K RAM disc combination is currently taking the market by storm.

A&B COMPUTING

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"Opus have got a winner on their hands. If you are looking for a disc upgrade you can't go far wrong by buying a Challenger, even if you already have a single drive this would certainly be a sensible upgrade path. This certainly gets my vote as best buy of the year."

A & B COMPUTING – JANUARY 1986

RAM DISC PERFORMANCE

"Here is the pièce de résistance of the whole system – a 256 K RAM disc. I honestly don't know how Opus can do it for the price.

Using the RAM disc is a real dream with disc based applications. Getting back to the actual performance of Spellcheck II, with the dictionary disc set up in the RAM disc, the result is amazing. When in automatic checking mode the text scrolls past so fast it is difficult to read. To put some figures on the improvement in speed, I checked a document just over 21 K long, which took 5 minutes 56 seconds on floppy and only 1 minute 7 seconds using the RAM disc."

A & B COMPUTING

ACORN USER

THE VERDICT

"At £249.95 inclusive you get the RAM disc, double-sided 40/80 track drive, Opus DDOS plus manuals and leads. Overall very good value for money, particularly if you are looking for a disc upgrade from scratch."

ACORN USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"The big deal comes in the speed. Being a purely electronic device, actions such as reading and writing are performed in fractions of the time a mechanically engineered disc drive takes.

To prove the point, I ran three programs on the RAM disc and the same three on the standard Opus drive with the following results (timings in seconds):

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2 BPUT 1 to 1000	1.14	4.71
3 PRINT/1000 strings	4.64	10.17

You don't need me to point out the huge speed increases."

ACORN USER

THE MICRO USER

THE VERDICT

"For the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS as well as bringing a permanent end to 'is it 40 or 80 track, single or double density?' problems. In addition all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger."

THE MICRO USER – FEBRUARY 1986

RAM DISC PERFORMANCE

"Of course it's not just a versatile disc drive, Opus also provides you with 256 K of RAM to play with. This RAM thinks it is a disc and the DDOS treats it as drive 4. If you have the 512 K version you get a drive 5 too. The RAM disc allocates sectors to files so that errors such as 'can't extend' are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM disc to a floppy disc."

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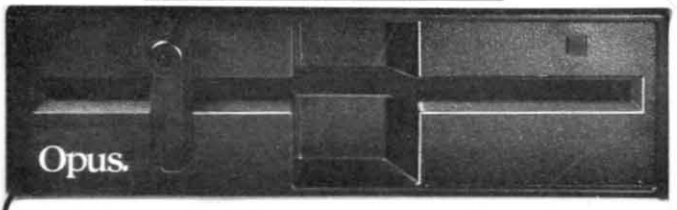

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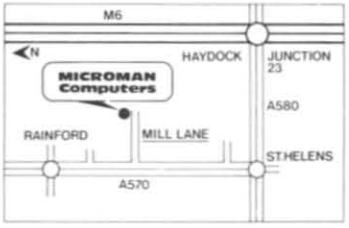

All-in-one packages neatly fit the bill

JO STORK examines a micro-based solution for a mythical company's mini-system problems

THE other day I gained a new client. I shall refer to this company as Startup Ltd and their current £25,000 Mini system demonstrates every known case of Lord Sodd's First Law of Natural Cussedness plus the majority of Murphy's and Finagle's additions. Startup's problems fall under five main headings:

☐ Hardware and software decisions based upon too little computer awareness.

☐ Hardware with the reliability of a politician's promise.

☐ Software with more bugs in it than a tramp's vest.

☐ Software which is susceptible to human error.

☐ Insufficient back-up and recovery procedures to cope with the hardware, software and human shortcomings.

The only practical solution I can put forward is to install a completely new system as if the firm had never been computerised. This needs to be achieved without disrupting what little work the equipment is currently performing.

Startup is a much larger company than most that rely on micros. Also its business has some unusual system requirements. Consequently while at first sight it appeared highly unsuitable for a micro-based system, closer study proved it to be ideal. Using it as a case study will show just how well micros can compare with larger, more conventional DP kit.

The firm required a comprehensive stock monitoring system, sales ledger, purchase ledger, 30/40 account nominal ledger, series of management and business statistics, and a 320 staff payroll at some future date.

When I put forward my micro-based solution Startup asked the following obvious questions. Can it be done on micros? How long will it take? How much will it cost? How reliable will the system be?

Once I had accurately sized the task, in other words calculated the volumes of data to be entered, calculated, displayed and reported, the following answers were formatted:

Micros can cope easily, given three of them. They will need to be networked although just linking via simple 4-wire RS232 may suffice.

It takes only a couple of months, given that the bulk of the work will be based on database, spreadsheet, word processing and graphics packages.

It costs much less than £25,000 and is exceptionally reliable. With triple redundancy of the hardware plus tried and tested software the only areas where normal problems of reliability can occur are in the 20 per cent of the software which my team will have to create.

These requirements can form the basis for describing the criteria by which I select suitable packages. These criteria are in my order of importance.

The Master 512 may well become the micro I eventually select. If the MS-DOS compatibility is sufficient to permit running of the brand-leading all-in-one packages then the advantages of price and BBC Basic for the programs my group needs to create will be hard to beat.

Fixed discs and streamer tape are needed, but compared to an IBM PC the costings look attractive. The hardware choice plays no further part in this article.

The heart of my solution for Startup is therefore the package(s) I choose. Vendors of accounting packages may wonder why I make no mention of such a system. The reason is that the books are simple and other requirements are far more important. My group can rapidly build a book-keeping system using an all-in-one package.

Since the whole success of the project stands or falls on the spreadsheet and database packages I will explain what I look for. While the requirements are specific to Startup the principle of drawing up a checklist of essential features the software must provide applies to every user.

Although I intend to use an all-in-one package, in other words where the various elements described below are purchased as a complete inter-linking system, each portion can be regarded as a checklist for the minimum features of a stand alone module.

A relational database is much more than a filing system and it must offer a variety of facilities.

Data must be able to be entered via an input template. The template is a form which appears on the screen. The cursor is automatically positioned to each field as it requires entry.

Automatic trapping of range errors, invalid characters and so on is carried out so that data input becomes as simple and swift as possible. The template itself is defined by the user.

The database must be able to display and print via output templates. In this instance the selected fields which need outputting are fed into the template prior to displaying or printing.

The ability to access any field of data relationally is

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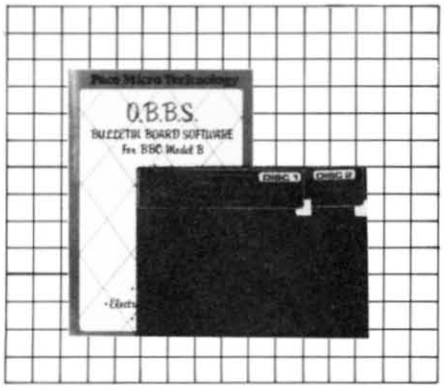

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PACE

From Page 11

crucial. Never mind the buzz word relational, what this amounts to is entering data into one file, merging it with data entered into one or more files, selecting out the required fields from the resulting combination and then sorting what is left into any required sequence.

Data must be held in a simple structure, so that writing one's own Basic programs which access the database is kept as simple as possible.

Since the system should have a life expectancy of at least three years and hopefully five, one has to leave sufficient room for expansion and the ability to handle 25 per cent more records than the maximum number currently anticipated is essential.

It is sometimes possible to split large files into a collection of smaller sub-files, but this is never wholly satisfactory because the data manipulation gets increasingly complex with time and the opportunity for error is greatly increased.

You should be able to pass any data entered via the database to any other module or package without needing to do more than request the transfer. This requirement only applies in the case of all-in-one systems.

The spreadsheet presents a different set of requirements. In the case of the database the ability to handle plentiful data is extremely important. This is not necessarily so for spreadsheets.

Many can handle vast matrices of many thousands of cells. This size is rarely needed, but is available on the principle that if you have 256k or more of memory then why not use it. Like most organisations, Startup will have some large files but limited calculation needs.

I have never had much use for such extravagant dimensions. Likewise I have no wish to spend an age at the keyboard priming the spreadsheet with its data. Finally, I cannot abide waiting while everything is updated. Consequently I move heaven and earth to keep each work area small.

There are further advantages in keeping each spreadsheet's size under restraint. Firstly, one can merge or consolidate two or more of them without any fears of overflowing memory. Secondly one does not have to constantly fiddle with windows or the print layout in order to output the results of the calculations.

I consider ease of constant, variable and formula entry to be important facilities. This is subjective, but several facilities can make this time-consuming task simpler. Automatic cursor movement, single key repetition of the last entry, comprehensive copying features and flexible formatting are the minimum I regard as essential.

Other criteria I look for are the ability to precisely define which rows and columns are to be output and a complete range of arithmetic, trigonometric and algebraic functions. As a poor alternative the ability to define my own functions may suffice.

If the mathematical ability of the program is poor many cells in a spreadsheet exist only as intermediate stages of a calculation – in other words a 30 × 25 work area only contains 20 × 15 cells which need displaying

Demonstration of Small SPREADSHEET and GRAPHS Produced from it.
AVERAGE SCORES OUT OF 100 OBTAINED FROM 7 GROUPS OF 10 MEMBERS/GROUP

GROUP	A	B	C	D	E	F	TOTAL
G1	73	79	84	69	67	81	453
G2	63	68	71	69	66	74	411
G3	83	74	79	68	71	74	449
G4	77	62	78	82	74	76	449
G5	69	75	78	53	86	82	443
G6	78	73	67	80	70	73	441
G7	72	74	78	70	73	74	441
TOTAL	515	505	535	491	507	534	3087

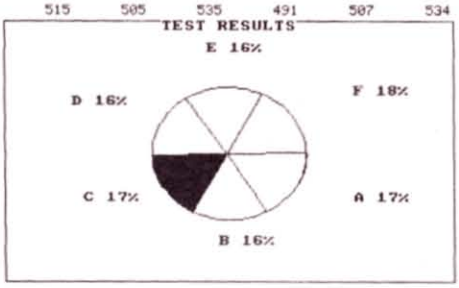

Figure 11: Sample pie-chart graphics

or printing out. The remainder merely clutter a report.

The ability to alter the dimensions of the spreadsheet without needing to change references and the ability to copy whole sections of the spreadsheet are valuable qualities.

It is not until you have needed these facilities that you realise how important they are.

Many columns in any work area are identical in their fundamental purpose. The formulae in a column representing January will be the same for February through December. Copying January into the next 11 columns with automatic amendment of the cell references is vital.

```
A  B  C
1
2     *
3
```

Let us assume the simple matrix above, where cell C2 contains the formula B2*0.15 When a new column is inserted between columns A and B the cell which was C2 is now D2.

```
A  B  C  D
1
2        *
3
```

Until you use the cheaper spreadsheets you will never realise that they still retain the formula B2*0.15 even though the old cell B2 is now cell C2. Having inserted the column you still need to change the formula to C2*0.15.

Whether inserting, deleting or copying the situation is always the same. If the row or column is a long one and/or several of them are affected this can be a mass of formulae.

The better spreadsheets automatically change the formulae of all the cells which have been affected by the changes.

The ability to file a spreadsheet in Ascii or display format is useful. Many spreadsheets use oddball

From Page 13

conventions for storing data and formulae. Programmers may feel this is reasonable if it leads to maximum data compaction or is necessary for interfacing with the database.

However it does make it awkward massaging the output before printing it off. I often insert printer control characters to change font or character/line pitch and so on in order that footnotes and the like appear differently from the body of the matrix, or the matrix stands out from the text of the report.

The spreadsheet should be able to insert text for headings, notes and so on. In the case of an all-in-one I can switch to the word processor but this is tedious – when all I want is to write the occasional line.

Many of the most popular spreadsheets are American in origin and it is a bore when one has to go through some fiddle to switch a $ to a £. All other things being equal I therefore tend to chose a British product.

More than any other piece of software, word processors prove the adage that small is beautiful. If all you want is to write a couple of circulars a month for your sports club the last thing you need is a behemoth program with a dozen pull down menus, a 100 page manual to explain them, requiring weeks until you are familiar with both. What you will need is a decent mail merge or interface to the membership file on the database.

If you are a journalist a few more hours spent familiarising yourself with the features is nothing compared to the hundreds of hours you will spend using the program. Nevertheless this is no excuse for selecting a word processor with features you will never need. Do you really wish to spend yet more time at the keyboard just because the program is using half of your CPU power servicing its own housekeeping?

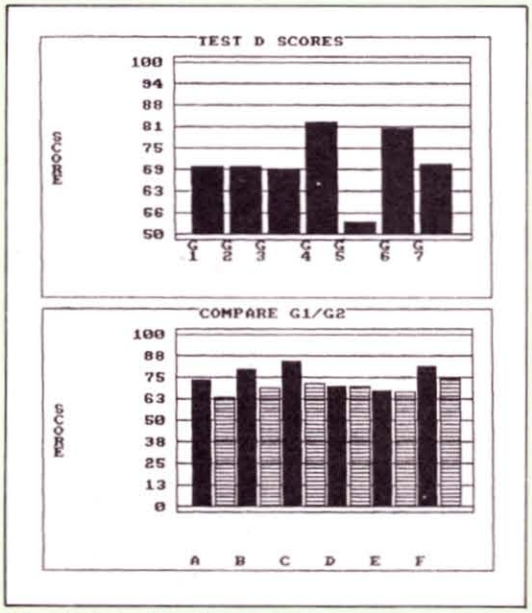

Figure 1: Typical bar chart graphics

High speed cutting and pasting of text is a useful facility. ROM-based packages are good in this respect, particularly if you have enough RAM to keep the whole text in memory.

Text files held on disc in simple Ascii format makes it simpler to handle outside of the word processor, such as when you require to transmit the text by phone and the ability to spool a text file while manipulating another is a valuable asset.

All Suppliers now claim their word processor is a WYSIWYG – What You See Is What You Get system but very few of them truly are. If you produce text with subscripts, font changes, different character densities and sizes on a single printed page, it is unlikely the monitor will display these characteristics.

Since the majority do not achieve this the software writers are in effect having to decide whether to display constantly the various printer control characters that will be needed or whether to use a special request to show them.

The former makes nonsense of WYSIWIG, since it blows the justification apart and you obviously never see the printer codes on the paper. The latter makes it all too easy to omit the control code which turns off some feature.

Finally, a spelling checker is a must, since "whyle I never mayk a misstake, my keybored never lernt English".

Graphics programs are fundamentally straightforward. However I will not look at any such system if it does not use files of extremely simple format. Such files are essential since they enable one to output data from any program with minimal effort in a form which the graphics module can handle.

The truism that a single picture is better than a thousand words is well founded. Unfortunately, all too frequently the graphics system you may be considering will be a conversion from another micro. The two micros may have totally different graphics characteristics.

Note that the system requires a hi-res colour monitor since the presentation style is based on colour rather than clarity.

Although I am asking a great deal there are several all-in-1 packages on the market which give me virtually the complete set of features I have described. Given enough of the facilities above Startup will be able to:

- Create all the files such as stock, sales, purchases, nominal and so on.
- Enter the data in as swift and simple a manner as is currently possible, given the state of the art.
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- Pass the data to the spreadsheet for calculation.
- Return the results to the files.
- Produce any formatted report that is required whether graphic, textual or tabular.

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Sleuth	(Basic debugging tool)	26.48	30.45
Communicator	RS432 & terminal)	48.17	55.39
Disc Doctor	(Disc utility)	23.91	27.50
Replica 2	(Backup tape to disk utility)	10.43	12.00
Betabase	(Database Disk)	20.00	23.00

COMPUTERS

BBC B+ 64K	382.67	439.95
BBC B+ 128K	417.35	479.95
Master 128	426.04	489.95

AMSTRAD COMPUTERS

PCW8256	382.56	439.95
CPC 6128 (Green)	247.78	284.95
CPC 6128 (Colour)	321.70	369.95

OTHER BBC PERIPHERALS

QFS 2.0 BBC Disc Interface	60.82	69.95
Penman plotter/turtle/mouse	217.35	249.95
Teletext Receiver	188.95	217.29
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Z80A Second Processor	312.95	359.89
ATPL ROM Board	39.09	44.95

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High quality diskettes 5.25" boxed in 10's with FREE plastic library case

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3M Standard	13.87	15.95
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At last – A system which you can tailor to your own needs

(makes other databases for the BBC micro look silly by comparison.)

MICRONET800 dec 85

NEW

POWER

5 files open at once, 8 subsets, 8000 cards per file, 255 fields per card, 200 characters per field. FULLY RELATIONAL e.g. copy customer/product details onto an invoice from different files.

SPEED

Search and access a card in typically 2 seconds. System Delta extensions giving machine code speed to BASIC applications.

SYSTEM DELTA

For the first time, data handling programs can easily be written using simple commands. Now your application can be tailored to look as you wish, and do what you want, without any knowledge of how the data is stored. System Delta also contains screen presentation, menu selection etc. e.g. one command to scroll around card.

Supplied with CARD INDEX APPLICATION for non-programmers, which uses most System Delta facilities. Other System Delta applications available early 1986 include Stock Management, Accounts and Estate Agents etc.

Card Index Application 54.95
(Includes card index support, System Delta ROM)

System Delta Advanced Reference Guide **19.95**
(Includes System Delta support)

MINERVA

MINERVA SYSTEMS, 69 SIDWELL STREET EXETER DEVON EX4 6PH TELEPHONE 0392 37756

Four questions that must be answered

WHILE businessmen must obviously look at the specific features of any piece of software they are considering installing in their organisation, the following general rules should be regarded as much more important. Consequently the systems reviewed below will be used as examples for demonstrating these principles in practice. They should prove highly indicative of many of the factors which are frequently overlooked.

- Can the task sensibly be done on micros?
- How long will it take to install and master the system?
- How much will it cost, both directly and indirectly?
- How reliable will it be?

Program: Life and Business Organiser
Price: £19.95 (ROM or disc)
Supplier: Gemini, Gemini House, Exmouth EX8 4RS. Tel: 0395 265165

I start with this program since it is a classic illustration of two of the points to watch when selecting software. Gemini's blurb says this program was produced "in conjunction with a lecturer in cognitive psychology". They should perhaps ask him for their money back, since I suggest he has misled them through misunderstanding a commercial mentality.

The prime mistake was that of the general concept. The idea of using a program such as LBO as a diary and memo pad must have appeared highly attractive. I suppose it could be useful for some people, but the more I think about it the more doubts I get.

Sorting appointments or reminders by type, date or time and printing them off seems a valuable time-saver and I have absolutely no complaint about the way these are handled. LBO is easy to use, performing everything it sets out to do both quickly and efficiently. What is more it could handle a lifestyle which a rock group would find strenuous.

The problem is that our diaries stay with us most of the time. They might get mislaid, left in the wrong jacket or even get coffee spilt over them, but in the main they are always available. Placing a similar function on a computer removes this vital benefit. If you do not have the appropriate listing with you when on the road or a phone call catches you in the middle of another program, you are stymied if you do not keep a normal diary as well.

My second doubt is based round the "Is it worth it?" topic. By the time you have switched on the computer, traced the data disc, loaded it, booted the ROM program, entered the data representing the appointment or payment date, possibly printed it off and closed down the system, you could have scribbled any necessary note in the diary and be well into item four of the next meeting's agenda.

This is without taking into account the time needed to set up the system or the likelihood of not keeping the data up to date. Sadly, on adding this all up LBO seems rather pointless.

Program: Money Management
Price: £12.95
Supplier: Gemini, Gemini House, Exmouth EX8 4RS. Tel: 0395 265165

After many years of producing systems and meeting every pitfall possible, I hate having to criticise other persons' programs since I sympathise with their problems. I am therefore delighted to have received a second Gemini product to which I can give unqualified praise.

In the last few months a crop of personal finance systems have come my way. I doubt the market is large enough to support them all, but this one certainly deserves to survive. Even a brief list of its features indicates it can handle more personal cash activity than a Getty or Rothschild is likely to see: 800 transactions a year, five pre-set asset accounts, five pre-set liability accounts, three pre-set income headings and 15 pre-set expenditure headings. While the number of accounts or headings cannot be changed, their labels may be modified to suit your own lifestyle.

Money Management is well thought out. It is a joy to use, since it is menu-driven and the use of colour to highlight key words is sensibly restrained. Year ends are easily handled. The excellent handbook is full of sensible information over and above that merely required to enter, alter, print or delete data.

The more I used this system the more I believed it

From Page 19

passed all four of my criteria. I therefore decided to perform a simple experiment by way of balancing the earlier review. I switched all the headings to suit the finances of a multi-thousand pounds turnover society for which I am the hon treasurer, and entered the first 30 postings of our day book. My conclusion was that this is a valuable market which Gemini could profitably address. Individuals or societies need look no further.

Program: Masterfile II
Price: £22 (disc)
Supplier: Beebugsoft, PO Box 109, St. Johns Road, High Wycombe, Bucks HP10 8NP. Tel: 0727 40307

Throughout my time with Masterfile II I understood why this software house is so successful. It may not meet every criteria for a full-scale database as laid down in last month's column, but it still requires 50 pages of close-typed handbook to describe all the facilities. In any case, many users will find a couple of extra or missing features is less important than the user-friendliness of a system or the four criteria of my opening paragraph. Masterfile II is a classic example of excellent design meeting all of my key selection points. As a mainstream micro database it excels.

On booting the system, you are presented with a 16 item main menu. It may seem excessive, but I prefer this to forgetting in which third level sub-menu a function is buried. All the normal database activities of

searching, sorting, entering, amending, deleting and printing records are initiated from this point.

A few figures will show that it is not just simple to use, but also extremely versatile.

- Files may contain a maximum of 18 fields.
- Each field can contain up to 255 characters.
- The maximum number of records is only limited by the capacity of one side of a disc. The more tracks you have the more data can be handled.
- Any single or combination of legal Basic arithmetic functions may be performed on any numeric fields.
- Records or part records may be displayed in any form required.

I often use a database to handle the data entry and output but produce my own application programs to merge files and tailor the information to the specific requirements of the organisation. I was therefore delighted to discover that even relatively mediocre programmers can overcome the two possible limitations of the system as supplied – the limit of 18 fields per file and only a single file being handled.

The package comes with several demonstration files which may be used for practice, but more importantly there is also a 40 line program in Basic which can be used as the basis for any file handling application you may care to develop. This means that it could become the heart of a highly sophisticated business system. In other words the limits of this first class product's facilities will be set by your imagination, not by the software.

Spreadsheet MkV
Price: £17.50 (disc)
Supplier: Contex Computing, 15 Woodlands Close, Cople, Bedford MK44 3UE. Tel: 023 03347

Each of the products here reviewed have clearly demonstrated success or failure in one or other of the critical factors which govern a system's suitability for an organisation. Objective matching of Spreadsheet MkV against all four was confirmation of my subjective impressions. By way of revision I will now look at each factor individually.

Can the task sensibly be done on micros?
The answer has to be yes, since spreadsheets are tailor-made for micros, even in companies with a million pounds of mainframe number-cruncher.

How much will the system cost – both directly and indirectly?
Contex are offering a host of facilities for less than £20, while running costs are hardly likely to be excessive. As an average I calculate it will take me a couple of hours to create, test, enter data and print off a spreadsheet with a 20 by 20 matrix.

How reliable will the system be?
Constant development certainly improves the product. Over the last four years and after five revisions it is now a thoroughly tested product and I would have no fears that any use I could put it to, no matter how sophisticated, would break it.

This leaves only one of the criteria which could possibly be less than perfect.

How long will it take to install and master?
The answer to this is not as easy as it may seem. The reason is that while complete newcomers to spreadsheets will find the handbook explains the commands extremely clearly as well as finding a large on-line help facility, it offers little real assistance as to the sequence or logic of stringing them together to produce a working model. As for more experienced spreadsheet users, while they will be producing large matrices, very swiftly, it will require a good few hours in order to investigate the farthermost reaches of the facilities. However this is typical of most of its competitors.

To conclude, Spreadsheet MkV is a first rate compromise and exceptional value for money. While not as fast as ROM based spreadsheets, nor able to handle particularly large matrices, it is extremely capable for those with typical commercial applications.

Jo Stork